Transition To Forward Flight

The same procedure will be used as for transition over land, except that a rate of climb is established to obtain approximately 20 feet altitude at 35 knots. This procedure is desirable for safe single engine water reentry, if flight cannot be sustained, and to preclude inadvertent flight back into the water.

After Takeoff From Water, Cruise And Before Landing On Water

Procedures are the same as in land operations.

Normal Approach And Landings On Water

The normal approach and landing procedures to water are the same as those described for land. Running landings on the water are not recommended and should not be performed except when an emergency requires it, or insufficient power is available to permit landing from a hover. Nose high helicopter attitudes should be avoided when operating near the water. The rotor downwash will ripple the water surface and aid in drift and depth perception; however, continuous reference to the RAD ALT should be made. Landings should be accomplished by holding the helicopter in a level to very slightly tail low attitude and allowing it to settle smoothly on the water. If the helicopter enters the water with forward speed above 10-12 knots, more forward cyclic is normally required, as the tail will tuck. Maintain collective until the helicopter decelerates and levels. Then, lower collective smoothly and position cyclic as required. Lowering the collective rapidly will cause a nose-up pitching motion which results in a reduced tail rotor clearance.

WARNING

To avoid tail pylon contact, do not exceed 7° nose-up attitude on touchdown.

CAUTION

If the helicopter contacts the water in a nose-down attitude, the nose will pitch down in proportion to the contact speed. If this occurs, proper corrective action is to slowly lower the collective and hold the cyclic neutral or slightly aft. Raising collective after the nose has dug in can cause the helicopter to pitch over and allow the blades to strike the water. Maximum allowable touchdown speed is 20 knots.

Rotor Shutdown The APU must be started prior to rotor shutdown due to the absence of under-frequency protection when waterborne and to provide hydraulic pressure for the flight control servo system and main gear box lubrication. In the event of a water landing as a result of a dual engine failure, rotor shutdown should be accomplished by allowing the rotor to coast down to a stop. If there is any danger of the main rotor blades striking the water due to wind or wave action, the rotor brake should be applied at as low an rpm as conditions will permit. While heading into the wind, decrease the speed selector(s) to the IDLE position. Once N_r has stabilized (40% to 45%), commence a smooth application of rotor brake, simultaneously applying right tail rotor pedal until directional control is lost (30% to 35% N_r). When directional control is lost, apply rotor brake full on. The helicopter will then swing to the left a minimum of 360°. Water and wind conditions above sea state 2 may cause excessive rolling and possible capsizing. After the rotor system has stopped, the helicopter will normally align itself to the wind and waves.

CAUTION

Without the stability and control afforded by the rotating blades, the helicopter may not right itself from a roll greater than approximately 25°.

Sea Anchor Deployment In emergency situations, if the depth of water will not permit anchoring, the sea anchor should be deployed to align the helicopter into the wind (increasing lateral stability) and reduce drift. The red hook at the end of the ripcord is pulled from the center of the pack and attached to the aircraft structure (a convenient attachment point is the forward end of the cargo door safety strap ring assembly). The snap hook on the end of the sea anchor line is then attached to the eye of the anchor line. After throwing the sea anchor overboard and forward, the ripcord is pulled to release the chute.

Anchoring the Helicopter

The anchor line should be at least three or four times the depth of the water in normal conditions, and as much as six or seven times the depth in rough or windy conditions. This provides for an essentially horizontal pull from which it develops its holding

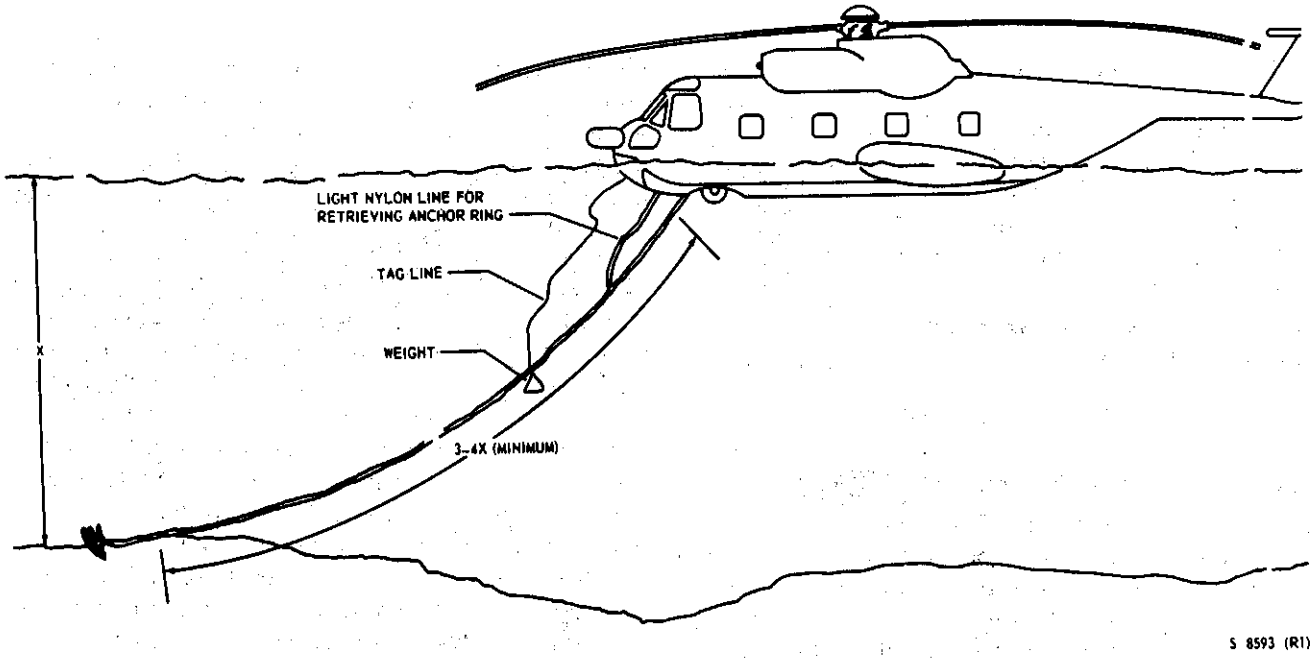


Figure 2-14. Anchoring the Helicopter

power. Under extreme conditions, a ten to twenty pound weight may be attached to the anchor line. In most instances, the 150-foot line is fastened to the eye of the anchor line with the attached snap ring. The entire length is then paid out after the anchor is lowered to the bottom. It is essential that the configuration shown in figure 2-14 be maintained, since a low centerline attachment ensures that the helicopter will align with the wind and waves to present minimum drag and resultant minimum strain on the anchor line. In emergency conditions on water too deep to anchor in, a sea anchor should be deployed. If a drogue is not available, a parachute or other object may be used to hold the helicopter into the wind and waves. This will minimize drift and roll as much as possible.

CAUTION

In no case should the anchor line be shortened or the prescribed configuration altered by attaching the anchor line to any of the internal tiedown rings in the cabin. The increased drag caused by the asymmetrical attachment and the resultant position broadside to the wind and waves can cause the anchor to drag or possibly could capsize the helicopter.

Weighing Anchor Using the light nylon line provided, pull the anchor line to the cargo door and retrieve the anchor.

Beaching

It is recommended that the helicopter be flown from the water to the landing area and not beached by taxiing from water onto land.

Water Rescue Procedures

The equipment required for a rescue platform recovery or hoist should be rigged before beginning the approach or when established in a stable hover. If possible, the crewmen should be seated with seat belts and harnesses fastened and seats facing forward during the approach to a hover. At the direction of the pilot the crewman will complete the Rescue Checklist. The Rescue Checklist shall be posted in the helicopter at the Hoist Operator's Station.

The Rescue Checklist consists of, but is not limited to:

1. Aircrewman's rescue harness on and adjusted.

2. Check rescue rig (basket, sling, platform) for condition and rigging.

3. Check hot mike (pilot and copilot response); request hoist power.

4. Roll and pitch bias centered.

5. Request permission to open up.

6. Rig rescue gear.

7. Conduct crew briefing.

8. Report ready to pilot.

CAUTION

Operation of the hoist at airspeeds above 80 KIAS will result in possible airframe/hoist damage.

Hoisting Procedures

General Most SAR hoists will be made from a boat or a ship. Although the procedures below cover this type of hoist, they are adaptable to land and water hoists. The pilot will brief the crew after evaluating the situation and prior to commencing the hoist. The quality of this briefing will determine how efficient and safe the hoist will be.

To make a successful rescue by hoisting requires close coordination and cooperation between the pilots and the crew. The use of standard rescue procedures will improve crew coordination by ensuring that pilots and crewmembers are using proven procedures and voice reports to make a rescue.

NEW The hoist operator will wear a heavy work-type glove on the hand used to guide the hoist cable and whenever possible will have his helmet visor down.

Extreme care should be used when hoisting the rescue device. If pendulum action and rotation of the rescue device are not quickly stopped, the rotations may increase to unmanageable proportions. The pendulum action may be dampened by moving the cable in the opposite direction of the movement of the rescue device. Rotation of the rescue device can be stopped, if detected early, by rotating the hoist cable in a 1 or 2 foot diameter circle in the opposite direction of rotation of the rescue device.

When pulling the survivor into the helicopter, the easiest method is to turn his back to the helicopter and pull him in. This procedure will reduce the possibility of a semi-conscious or injured survivor fighting the hoist operator. The rescue device should never be removed from the hoist cable or the survivor until he is safely inside the helicopter and clear of the door.

Standard Hoist When the helicopter is established in a hover, the pilot will adjust his altitude to maintain obstruction clearance, check his torque/T5, give last minute instructions to the copilot and hoist operator.

When the pilot is satisfied that all is ready, he will direct the crewman, "go on hot mike." At this time, the crewman should go on the hot mike, start the hoisting rig down, and begin normal hoisting ADVISORY REPORTS.

When the pilot directs the crewman to "conn me in," the crewman should begin giving the pilot directional COMMANDS to position the helicopter over the hoisting area.

NOTE

COMMANDS are given in reference to the fore and aft axis of the helicopter to direct the pilot to move the helicopter in that direction. ADVISORY REPORTS keep the pilot informed of everything else that is occurring during the rescue.

After the basket, litter, or sling is on deck, the pilot must hold a steady position. When the person being hoisted is safely in the rescue device, and the helicopter is in a steady hover directly over the rescue device, the crewman will raise the hoist. During the hoist evolution, continuous COMMANDS will be necessary to keep the pilot exactly over the hoisting area.

Once the rescue device is clear of the deck and all obstructions, the crewman will notify the pilot with the appropriate ADVISORY REPORT and continue to give COMMANDS moving the helicopter clear of the vessel until the pilot reports "Cease commands".

After reporting "Cease commands" the pilot will continue to move off on his own until he is well clear of the vessel and in a safe, stable hover.

When the rescue equipment is safely in the cabin and the cargo door is closed, the crewman will report "Going off hot mike, ready for forward flight," after which the pilot may transition to a safe single-engine altitude and airspeed.

Boat Hoist Communications should be established with the vessel as soon as possible, prior to arriving on scene, to expedite the rendezvous and the hoist. The vessel should be briefed as follows:

1. The desired course and speed of the vessel (course 35° to 45° to right of wind line and underway).

2. The method of retrieval (basket, litter) to be provided by the helicopter.

WARNING

Do not use vessel's equipment except as a last resort. Aircraft litters are specially stressed and rigged for hoist operations and must be used for maximum safety of the patient.

3. To discharge the static electricity prior to handling the hoisting rig.

4. If hoisting rig is to be moved from the hoist location, to have the vessel's personnel disconnect the hoist cable.

5. To ensure that hoist cable is not secured to any part of the vessel.

6. To have vessel lower and/or stow all antennas, booms, rigging, flagstaffs, loose gear, etc., from the hoist area.

7. Additional information to be passed as required.

NOTE

During hoisting operations, advise the vessel of the number of persons on board. In the event of a mishap to the helicopter, the crew of the vessel will know how many persons to rescue from the helicopter. It may also be helpful to know the number of persons on the vessel.

If voice communications cannot be established, the pilot, upon arriving on scene, may have to drop message blocks, use hand signals, blackboards, loudhailers, or may just have to move into position and commence the hoist. The rescue checklist should be completed prior to commencing the approach or when established in a stable hover.

WARNING

Extreme caution must be exercised when hoisting from small boats and rafts, particularly if unable to maintain way, due to the danger of capsizing them with rotor downwash. If the boat can maintain way which when combined with relative wind exceeds 15 knots, a successful hoist can generally be performed; however, broadside approaches can result in the vessel capsizing.

The helicopter should be brought to a hover about 15 to 20 yards short of the vessel. The aircrewman may now be directed to go on HOT MIC and conn the pilot into position. The hoisting rig should be started down as early as possible to limit the hoist time over the vessel. The helicopter will be positioned over the vessel at as low an altitude as safely practicable. It is desirable to have the vessel underway or maintaining steerageway with the wind over her port bow. The aircrewman must keep the pilot informed at all times.

As the basket clears the deck and obstructions, move the helicopter clear of the vessel. This is advisable for two reasons:

1. To prevent serious injury to personnel or damage to the vessel if an engine failure occurs, and

2. To let the pilot see the vessel, so that he can maintain a more stable hover. When clear of the vessel, the pilot may slowly lower the helicopter to a safe hovering altitude as the hoisting rig is raised.

When the hoist operator has the rescue device inside the cabin, he should report, "Basket in cabin." When certain other tasks have been performed (SEE HOISTING PHRASEOLOGY SECTION), he should report "Going off hot mike, ready for forward flight." The helicopter should not be transitioned to forward flight until the crewman reports ready for forward flight.

WARNING

Discharge static electricity prior to attempting a hoist. Breaking contact will result in an immediate rebuilding of the electrical charge. Do not ground the hoist near spilled fuel.

WARNING

In the event of electrical failure to the hoist, attempt to determine the cause (bent cable, fouled cable, etc.), visually check the hoist, and secure the Hoist Master Switch prior to using manual hydraulic override. Use of override with fouled reel or cable can cause damage and possible parting of cable. If resistance is met when using override, operation should be stopped immediately to prevent further damage. The hoist master switch must be placed in the OFF position when using the manual hydraulic override to prevent injury to personnel or equipment, should electrical power suddenly be restored. The intermediate limit switch and the up and down limit switches are inoperative with electrical power loss and the hoist is capable of operating in excess of 100 fpm in this configuration. Therefore exercise caution when operating near cable extremities, and adjust cable speed accordingly.

CAUTION

Before the rescue device is raised from the deck, the helicopter should be in a stable hover directly over the rescue device.

CAUTION

The crewman must never allow the hoist cable or hook to be secured to any part of the vessel. If this should happen, the crewman should immediately run out slack cable, advise the pilot, and then attempt to have the boat personnel assist in releasing it. If the attempt to free the cable or hook is unsuccessful, the hoist shear may have to be used.

CAUTION

The AFCS heading retention feature should be used to prevent inadvertent heading change.

NOTE

Use of an altitude coupled hover may be desirable during hoist operations.

Trail Line Hoist

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

A weight should be attached to the end of the trail line without the weak link. (The weak link is a safety device which protects the helicopter by not allowing more than 300 pounds of force to be applied to the trail line. If more is applied, the weak link will part.)

The other end of the trail line may be fastened to either the hoist hook small eye or the rescue device.

CAUTION

During a hoisting evolution, the trail line is snapped to the hoist hook or the hoisting device by the weak line, JUST BEFORE the device goes out the door. Until then the trail line must be HAND HELD.

Procedures for a Trail Line Hoist The procedures for a trail line hoist are exactly the same as for a boat hoist through the approach and hover astern of the vessel. The weighted trail line is passed to the vessel using standard hoist procedures.

CAUTION

The aircrewman must use extreme care when handling the trail line to prevent getting it fouled in the helicopter rotor system.

CAUTION

The pilot will normally lose sight of the vessel during this phase of the operation and will have to rely entirely on the hoist operator for position information.

Once the trail line is on the vessel and the boat crew is tending it, the hoist operator will report, "Trail line on deck," and then give COMMANDS to the pilot directing him clear of the vessel while paying out slack in the trail line. When the pilot can again see the vessel and has reported "Cease commands", the hoist operator will begin to lower the hoist and continue to give ADVISORY REPORTS.

Shipboard personnel then use the trail line to guide the rescue device into the desired location.

When the rescue device is on the vessel's deck and the survivor is ready for hoisting, the pilot will direct the crewman to "conn me in" at which time the hoist operator will give the pilot COMMANDS to get the helicopter back to a position directly over the hoisting rig and hoist vertically from the deck. Retrieving the rescue device vertically may not always be possible. Be aware of this and be prepared to recover the rescue device at an angle. However, when conditions permit, always recover the rescue device vertically.

As soon as the survivor is clear of the deck and all obstructions, the crewman will give the pilot COMMANDS to clear the helicopter away from the vessel, usually left but sometimes back until the pilot reports "Cease commands." This position should be maintained until the survivor is in the cabin and the trail line is either retrieved or discarded and the crewman has reported ready for forward flight.

Once clear of the vessel the pilot will continue to move off on his own until he is well clear of the vessel and in a safe, stable hover.

Hoists From Water As the helicopter approaches a hover, the aircrewman should be directed to put the hoisting rig over the side. The helicopter should be brought to a hover, over the survivor, with assistance of the crewman's COMMANDS and ADVISORY REPORTS. It may be necessary to drop charts, floats, smoke markers, etc., upwind to give the pilot some reference points during the hoist. Other aids that may be used for reference are water foam, debris and rotorwash patterns.

WARNING

Rotor downwash may cause difficulty in breathing and could result in the drowning of the survivor. Consideration should be given to the utilization of trail line procedures for a conscious survivor.

Dewatering Pump Delivery Because of a dewatering pump's size and weight, the pump could easily cause injury to personnel and damage to the vessel to which it is being delivered. This is particularly true if the vessel is pitching and rolling in a rough sea.

The indirect method of delivery is to deliver a weighted trail line to the vessel. Then the helicopter moves off and establishes a low hover clear of the vessel. The trail line is securely attached to the pump without a weak link and the pump is put into the water.

The vessel's crew can pull the pump to them through the water. The trail line is delivered to the vessel in the standard manner, and then the crewman gives the pilot COMMANDS to move the helicopter until the pilot can see the vessel. The pilot will then continue to move LEFT or LEFT and AFT of the vessel until the vessel is well clear of the rotor downwash and the rotor blades. The pilot will then begin a descent to a low hover over the water after which the hoist operator will connect the trail line to the D-ring on the drop pump bridle. When the hoist operator receives the command from the pilot to put the pump into the water, he will simply push the drop pump out of the door, taking care that the pump does not become fouled in the line that is connected to it. He will also make sure that when the pump goes out, the line cannot foul on the helicopter.

The boat must be dead in the water to deliver the dewatering pump this way, and there must be sufficient personnel aboard the vessel to lift the pump aboard.

If there is some reason why the previous procedures cannot be used, the drop pump can be safely delivered directly to the deck of the vessel, but extreme care must be taken to avoid damage to the vessel or injury to personnel on deck. This can be done by using the trail line first, remembering that this is a hoist and the weak link should be attached as described under TRAIL LINE HOISTS. Instead of a trail line hoist using a rescue device, the hoist will be made using a pump. In this type of hoisting, try to remain over the vessel during the hoist. Moving left will make it very difficult for deck personnel to retrieve the pump. Once the trail line is delivered, personnel on deck can steady the pump and guide it directly to a spot on deck. This is a variation of the standard hoist, which works equally well with a basket, litter or pump.

Hoisting Phraseology The effectiveness of a hoist operation depends upon the ability of the pilot and crewman to act and communicate as a team. Standard voice procedures reduce the chance of misunderstanding. The crewman should tell the pilot what he wants the helicopter to do, not what the helicopter is doing.

NOTE

Commands are given in reference to the fore and aft axis of the helicopter, to direct the pilot to move the helicopter in that direction. Advisory reports keep the pilot informed of everything else that is occurring during the rescue.

NOTE

Combination COMMANDS, such as "FORWARD AND RIGHT 5" may be used in horizontal directions. At certain times when you are trying to hoist or maneuver in a restricted area, a COMMAND of "FORWARD 5," followed by "RIGHT 5," will not work. The only way is to move on a diagonal.

HOISTING AND RESCUE PLATFORM COMMANDS

COMMAND	MEANING
FORWARD 5	Move helicopter forward 5 feet.
BACK 5	Move helicopter backward 5 feet.
LEFT 5	Move helicopter left 5 feet.
RIGHT 5	Move helicopter right 5 feet.
UP	Increase helicopter altitude. Do not use a distance with this command.
DOWN	Lower helicopter altitude. Do not use a distance with this command.
HOLD	Hold helicopter in a position relative to the target.
EASY_____ (left, right, forward, back)	Move helicopter very slowly in the direction indicated, a very small distance.
FORWARD AND RIGHT 5	Combination COMMAND as discussed above.
GO ON HOT MIC	The hoist operator begins giving ADVISORY reports.
CONN ME IN	The hoist operator begins giving directional COMMANDS and continues giving ADVISORY reports.
CEASE COMMANDS	Pilot no longer requires COMMANDS to maneuver.
SHEAR! SHEAR! SHEAR!	The hoist operator and copilot should activate their respective shear switches.

HOISTING ADVISORY REPORTS
(Example of Basket Hoist)

ADVISORY REPORTS	MEANING
ON HOT MIKE, HAVE TARGET IN SIGHT, BASKET GOING OUT THE DOOR.	Hoist operator is commencing the hoist.
BASKET BELOW AIRCRAFT	Basket is below the hull of the helicopter.
BASKET HALFWAY DOWN/UP	Basket is halfway between the helicopter and the surface.
BASKET HOLDING ____ FEET OFF THE WATER	The basket has been lowered to a safe distance from the water and will not be lowered any further until over the hoist area.
BASKET ON DECK	The basket is on the deck of the vessel.

MAN GETTING IN THE BASKET	Self-explanatory.
MAN IN THE BASKET	The man is in the basket and ready to be hoisted.
PREPARE TO TAKE THE LOAD	Hoist operator is taking in the slack of the hoist cable and preparing to lift the basket clear of the deck.
TAKING THE LOAD	The hoist operator is lifting the basket with the hydraulic hoist.
BASKET CLEAR OF VESSEL, CLEAR TO MOVE LEFT	The basket is well clear of the deck of the vessel and not in danger of fouling in the vessel's rigging. Copilot should clear area to the left. Move the helicopter left so pilot can again see the vessel. COMMANDS are required until the pilot reports "Cease commands."
BASKET CLEAR OF VESSEL, TRAIL LINE STILL ON DECK, CLEAR TO MOVE LEFT __FEET	If a trail line was used, this modification of the previous similar report reminds the pilot that the trail line is still on deck and to exercise caution when moving left.
BASKET OUTSIDE DOOR	Basket is level with the door and is being brought into the helicopter.
BASKET IN CABIN	Basket is in the cabin and being disconnected from the hoist cable.
BASKET IN CABIN, RETRIEVING TRAIL LINE	The basket is in the cabin and now the hoist operator is concentrating on getting the trail line aboard. Under adverse conditions, do not hesitate to cut the trail line or disconnect the trail line from the hook and throw it overboard. It may be safer not to try to get it back.
CABLE FOULED	The hoist cable has become fouled on the vessel.
BASKET FOULED	The basket has become fouled on the vessel.
GOING OFF HOT MIKE, READY FOR FORWARD FLIGHT	Basket is disconnected from the hoist cable; the hoist cable has been run up to the limit stop. The door has been closed, and the hoist operator is going off hot mike. All passengers and crewmen should be strapped in except for those required to be up and about the cabin in the performance of their duties.
CABIN SECURED	All rescue equipment has been stowed; all passengers and crewmen should be strapped in except for those required to be up and about the cabin in the performance of their duties.
LOST TARGET	Pilot has lost sight of the hoisting reference.*
TARGET	Pilot can again see the hoisting reference.*

*Hoisting Reference-A visual reference such as a portion of the boat, runway, or platform that will allow the pilot to maintain a stable hover to complete the hoist. It is normally not possible to maintain visual reference with the actual position from the hoist is to be made.

RESCUE PLATFORM PROCEDURES

Rescue Platform Recovery in Calm Water The rescue platform will normally be used to effect the rescue of survivors from sheltered water or smooth, calm, open sea conditions. The approach to a hover will be made as described earlier. When in hover, instruct the aircrewman to open the door and lower the rescue platform; then go on HOT MIKE and establish ICS communications. When the pilot directs the crewman to "CONN ME IN", the crewman should begin giving the pilot continuous directional commands and advisory reports to supplement the pilot's picture. The commands and advisory reports should continue until the rescue is complete or the pilot directs "CEASE COMMANDS". Immediately after touchdown, the aircrewman should position himself on the platform with his belt adjusted to permit complete freedom of movement on the platform. Water touchdown should be made with the survivor at about the 1 o'clock position, outboard of the rotor downwash. Maneuver the helicopter to bring the survivor alongside the rescue platform. Forward flight should not be commenced until the cabin is secured.

WARNING

As the platform approaches the survivor the closure rate must be near zero to ensure that the helicopter does not overrun the survivor. To prevent rotor blade contact, the boat hook, if used, must not be raised above the cargo door.

WARNING

Do not air taxi close to a small raft as the downwash could capsize the raft and possibly cause contact with the blades. Land short, as in a survivor recovery from the water, and using minimum collective, water taxi for the recovery.

WARNING

Extreme care must be used in approaching parachutes in the water. When recovering an immobile survivor attached to a parachute, land clear to one side and have the aircrewman use a raft or swim to the aid of the survivor and free him of the parachute.

NOTE

The heading retention feature of the AFCS should be used to maintain helicopter heading.

NOTE

The aircrewman may attach his safety belt to a jumpseat seat belt ring to enable him to reach the outboard edge of the platform.

Rescue Platform Recovery in Rough Water An approach to a hover will be used. After transitioning to a hover, instruct the crewman to open the door and lower the rescue platform. Turn the helicopter to place the major swell on the port bow to the port beam, holding the survivor in about the 1 o'clock position well outside the rotor wash. While maintaining this general relationship, evaluate the sea. Instruct the crewman to go on HOT MIKE and establish ICS communication and when the pilot directs the crewman to "CONN ME IN", the crewman should begin giving the pilot continuous directional commands and advisory reports to supplement the pilot's picture. The commands and advisory reports should continue until the rescue is complete or the pilot directs "CEASE COMMANDS". Close on the survivor, and when sea conditions permit, land with the survivor just inside the rotor disc. During this phase, the copilot must alertly scan the sea to port. When the survivor is on the platform, establish a safe hover and as the helicopter clears the water, turn into the wind. Maintain the hover until ready for forward flight.

CAUTION

The rough water platform pickup is considered a hazardous maneuver and should be considered only if a hoist cannot be accomplished.

CAUTION

When landing crosswind in sea state 2 or higher, rotor clearances will become critical. Use the heading retention feature of the AFCS to maintain helicopter heading.

NOTE

Whenever the platform is stowed ensure that the platform support cables are secured with bungee.

ADVISORY REPORTS (RESCUE PLATFORM)

ADVISORY REPORT	MEANING
MAN APPROACHING PLATFORM	The survivor is close to the platform, and the distance between the survivor and the platform is closing.
MAN AT PLATFORM	Self-explanatory.
MAN ON PLATFORM CLEARED TO HOVER	Self-explanatory.
MAN IN CABIN, GOING OFF HOT MIKE	The crewman is going off the hot mike and will be assisting the survivor and stowing equipment.
CABIN SECURED, READY FOR FORWARD FLIGHT	Self-explanatory.
PICK UP INTO HOVER, MAN DRIFTING _____	This is very important. If the man being rescued drifts into an area that would endanger him, such as too far aft, under the sponson or the hull of the helicopter, immediately lift into a hover. This advisory report informs the pilot of a potentially serious situation. "UP" is a COMMAND and differs in that it represents an IMMEDIATE EMERGENCY!

NOTE

Operational situations may require the use of the boarding ladder instead of the rescue platform to complete the mission.

Towing

Towing with the helicopter is prohibited except with a line hand held by the aircrewman. Towing in this manner should be undertaken with great caution. Under no circumstances shall the line be attached to any part of the aircraft or the aircrewman. The pilot shall ensure that the line is firmly secured to the vessel and that the bitter end is hand held by the aircrewman.

COUPLED HOVER PROCEDURES

In a fully coupled hover, the coupler maintains the selected altitude, ground speed and drift relative to the surface. Altitude and drift control can be utilized singularly or together by use of the respective toggle switches. To establish a coupled hover, accomplish the following:

1. Doppler - ON.
   Land-sea switch as required.
2. Pilot's Hover Indicator - D MODE.
3. Cyclic and Altitude Coupler Toggle Switches - AS DESIRED.
4. Altitude Pot - SET TO DESIRED HOVERING ALTITUDE.
5. Speed and Drift Pots - CENTERED.

NOTE

When tracking a boat, set speed pot for approximate speed of the vessel.

6. Hover Indicator - CHECK DRIFT.
7. Cyclic Stick - SET TO REQUIRED POSITION.

NOTE

Failure to eliminate stick trim forces, prior to engaging coupler, will result in other than the desired hover attitude.

8. Coupler Engage Button - DEPRESSED.

WARNING

Do not transmit in the 3.0 to 3.6 MHz range during doppler or coupled hover operation. Transmission in this range will result in erratic helicopter attitude.

CAUTION

During coupled hover operations, when doppler authority (23 ± 5 kts) is exceeded in a lateral or fore and aft direction, the helicopter will gradually accelerate in that direction until contained by the pilot.

CAUTION

Hovering over an irregular surface (mountainous terrain, large vessel, etc.) which can cause a disparity in doppler or RADALT return signals will induce into the coupler errors which can result in undesirable helicopter gyrations. The flight controls should be monitored closely under these conditions.

NOTE

With altitude coupler engaged, collective friction should be removed so as not to inhibit collective movement.

If hover trim control is desired, the cyclic coupler toggle switch must be on prior to engaging the hover trim button. To terminate hover trim control operations, the cyclic coupler toggle switch must be turned off or the entire coupler disengaged. To disengage the helicopter from a coupled hover, proceed as follows:

1. BAR REL Button - DEPRESS AND HOLD.
2. Coupler Disengage Button - DEPRESS.

NOTE

If coupled hover procedures are terminated with an instrument takeoff, do not disengage the bar alt by using the bar off button until safely established in a climb.

3. BAR OFF Button - DEPRESS. (COPILOT)

NOTE

The BAR ALT will not disengage with power applied to the altitude hold portion of the coupler system.

4. BAR REL Button - RELEASE.
5. Coupler Toggle Switches and Set Pots - RESET AS DESIRED.

FORMATION FLIGHT

GENERAL

The Air Operations Manual (CG-333) outlines the circumstances under which formation flying may be conducted. When flying formation it is imperative that the flight leader fly as smoothly as possible with a minimum of attitude and power changes. The flight leader must allow his wingman at least 10% torque and airspeed for maneuvering. Communications between units of the formation are mandatory. The normal distance between adjacent helicopters in a two helicopter section will be one rotor disc diameter. The wingman will fly a step-up position of 10 feet between corresponding parts above the lead helicopter.

Basic Formations

1. Column. Wingman flies directly astern of the flight leader.

2. Parade. Wingman flies on a bearing of 45° left or right of the astern position of the flight leader. This is a show or flyover formation. The wingman is not free to maneuver except to maintain his position.

3. Tactical. Wingman flies on a bearing of 35° left or right of the astern position of the flight leader. The wingman is free to maneuver from side to side as he desires.

4. Cross country cruise. Wingman flies on a bearing of 35° left or right of the astern position at a distance of 3 to 4 rotor disc diameters from the flight leader.

Maneuvering

When the formation is maneuvering, the flight leader should advise the wingman by radio of the expected evolution. To change his position in a flight, the wingman generally will have to adjust his power in addition to maneuvering the helicopter. For example, when directed to move from parade left to parade right, the wingman initially will need to reduce power slightly so that he can drop back and then add power as he commences the cross over, maintaining the desired one rotor disc distance and the 10 foot step-up throughout the maneuver. As the wingman arrives in the position of parade right, a slight power reduction is required to prevent overrunning the flight leader.

1. Breaks. The flight leader will break away from the formation by banking 10° to 15° (angle of bank for standard rate turn for the airspeed). A 3 to 5-second break interval is recommended.

2. Join-up. The maneuver in which the wingman joins up on the flight leader is one of the most difficult maneuvers in formation flying. The wingman is attempting to position his helicopter on a bearing 45° aft of the flight leader's beam and then fly in on this bearing. To commence this maneuver it is necessary for the two helicopters to be relatively close to each other.

The wingman should position himself within the turning cycle of the flight leader when the flight leader is circling at a standard rate turn, pick up the 45° bearing, and adjust his turn to maintain this bearing with a slow constant rate of closure. Too fast a closure rate, close in, is very dangerous and should be avoided by the wingman by shallowing his turn. Do not reduce closure rate by increasing bank to such a degree that the flight leader goes out of sight, and avoid getting ahead of the 45° bearing, particularly close in.

CARGO SLING OPERATIONS

The mechanical and electrical operation of the cargo sling is explained in detail in section IV.

PRE-FLIGHT

The most important phase of a cargo sling mission is thorough planning. The operating area should be selected to avoid flight over vehicles, buildings, or congested areas and to provide optimum safety. Areas of dust, mud, snow, or ice should be avoided. All personnel concerned with the mission should be thoroughly briefed on their duties and responsibilities during the operation. Ground crew personnel should wear helmets with visors down and radio cords tucked in. They must exercise sound judgment and common sense in positioning themselves so that if the load should be accidently dragged or lifted, they can move clear immediately to avoid injury. If an emergency occurs during cargo sling ground operations, the helicopter and ground crew personnel should move in opposite directions to clear each other. The helicopter should move to its left while ground crew personnel move off to the right. Ground crew personnel should make every effort to work at the right side of the load (with respect to the position of the helicopter over the load) so that in an emergency, they can clear from under the helicopter without climbing over or moving around the load.

Complete a Weight and Balance Form F and a TOLD Card prior to attempting the flight. Do not consider wind velocity in advanced planning except to note that any wind encountered may serve to improve helicopter performance. It is recommended that training loads not exceed 2000 pounds.

Equipment Inspection.

The following items should be inspected prior to cargo flight.

1. Cargo sling and attachments for security.

2. Manual release for proper rigging.

3. Cargo hook for security and condition. Check mechanical and electrical operation of the cargo hook.

IN FLIGHT

1. Equipment preparation.

a. Ensure sling is fully extended and all cables and lines are clear.

b. Pilot's HOT MIC LISTEN - ON.

c. Cargo Hook Switch - SLING.

2. Approach and hook-up.

a. Aircrewman conn pilot into position directly over cargo, using hoisting voice procedures.

b. Ground personnel ensure static electricity dissipated.

c. Aircrewman monitor hook-up; ground personnel clear of cargo.

d. Aircrewman report hook-up and ready for lift.

e. Pilot smoothly increase power until the cable is under tension and slowly continue power increase to lift off.

f. Aircrewman report cargo clear of deck.

CAUTION

When the maximum power available is not a minimum of 10% greater than that required to hover out-of-ground effect (OGE), the maneuver then becomes one of a very demanding nature and should not be attempted unless mission urgency dictates otherwise.

NOTE

For training, a 10 - 15 foot cable should be attached to the selected load. The length of cable will vary in actual operations.

g. Once in a hover, allow the load to stabilize and note the power required to hover.

TRANSITION TO FORWARD FLIGHT

Transition to forward flight and establish a positive rate of climb as soon as translational lift has been obtained. Do not descend during transition. Acceleration and maximum air speed, to prevent oscillation, will be dependent on the type of load carried. Some loads will require air speeds as low as 10 knots to maintain stability. The helicopter should not be maneuvered abruptly.

NOTE

The aircrewman should monitor the load for oscillation and other unsatisfactory indications.

CRUISE

1. Cargo Master Switch - SAFE. After 500 feet terrain clearance.

CAUTION

When the cargo hook switch is in the SLING position, the pilots should exercise caution to preclude inadvertent release of the load.

CAUTION

Do not fly over populated areas, buildings or other surface conditions that would be endangered or damaged in inadvertent cargo release. Gusty wind conditions, action of the load, or aircraft equipment malfunction can cause or require unplanned load release.

LOAD STABILITY

Most of the problems encountered in helicopter external lifts concern the instability of loads in flight as the sling load is seldom aerodynamically stable.

Load instability will occur whenever the weight of a suspended load is not sufficient to hold it down against the drag of the air through which it moves. Such loads will normally turn broadside to the direction of flight, thus exposing maximum drag surface. Stabilization of such loads may be assured by one or more of the following means:

1. Reducing airspeed.

2. Make slow control movements.

3. Increasing the weight of the load.

4. Reducing the drag surface by altering the relationship between the center of gravity and the center of pressure of the suspended load in such a way as to assure that the narrowest surface points in the direction of flight.

5. Drag surface reduction can be achieved by adding surface to the rear of the load or adding weight to the front. The general rule is that stability will be assured at practical helicopter speeds when the load's center of gravity is located at the front third of the surface area.

CAUTION

Spinning may result in pendant failure. If conditions permit, a spinning load may be placed on the ground or water to reduce the spin rate. Release uncontrollable loads.

APPROACH

1. Use a normal approach.

2. HOT MIC - ON.

3. Cargo Master Switch - SLING. At 300 feet AGL.

a. Do not switch to AUTO position until over a safe drop area.

4. Crew Report - CARGO ON DECK.

5. Cargo - RELEASED.

6. Sling - STOWED PRIOR TO LANDING.

NOTE

Cargo operation without AFCS should be undertaken with caution. Without the stabilization, oscillation of the helicopter and load can endanger ground personnel.

NOTE

The radar altimeter may be unreliable with a load attached.

ROUGH AREA OPERATIONS

GENERAL

Helicopter missions require operations to unprepared areas at sea level or high altitude, over land or sea, over flat or mountainous terrain, during daylight and darkness. The following procedures shall be used for any descent into unfamiliar terrain whether or not a landing is to be made.

CONFINED AREA LANDINGS

Landing Site Evaluation

On the spot evaluations may be made by making passes into the wind, over the intended landing site, at various altitudes and airspeeds. When operating from closely confined areas, the final analysis of the situation and the decision to land must be made by the pilot. The prime factors to be considered are outlined in the following paragraphs:

1. Wind direction, velocity and consistency. In planning critical helicopter operation, the winds should not be relied on to aid a landing in an obstructed area. If the helicopter is riding a gust on the final approach and the gust decreases as the helicopter is approaching a hover, the helicopter may "fall through" if the wind factor has been planned to aid the landing. If all other factors are marginal, and the landing is dependent upon wind conditions, the helicopter should be lightened. Another effect of wind that must be considered is the "lee effect" of wind over hills, ridges and obstacles. The down drafts resulting from this condition particularly affect the final phase of landing.

2. Rough terrain. When a landing is required on an extremely irregular surface, it may be advisable to have the flight crewman guide the pilot, lower personnel on the hoist, or discharge them from a minimum altitude hover position to improve the landing site, or to aid in directing the touchdown prior to attempting a landing.

3. Landing on slippery areas. Landing on wet and icy areas is hazardous, and due caution must be exercised when landing or taxiing. Brake action will tend to induce skidding.

High Reconnaissance

Fly the high reconnaissance at approximately 300 feet above the landing site obstacles to permit observation of the intended landing area, and all possible approach and takeoff routes. Accomplish the following:

1. Before landing check.

2. Approach/departure and escape routes. Consider the terrain features and select the most desirable area over which to maneuver or depart from in the event an emergency situation arises.

3. Site elevation. Estimate the elevation of the landing area. This can be determined by pilot judgment or by the pressure altimeter.

4. Power available. Determine the maximum power that is available. Compare this power available with TOLD computations. Reset speed selectors to 103% Nf.

CAUTION

When the maximum power available is not a minimum of 10% greater than that required to hover out of ground effect (OGE), the maneuver then becomes one of a very demanding nature and should not be attempted unless mission urgency dictates otherwise.

Low Reconnaissance

Make a low and slow pass (25-30 KIAS) and observe the area closely to determine wind direction and velocity, obstacles in the approach path, landing area condition, and estimate maximum torque that may be required to land.

APPROACH

1. Brief the copilot and crewmen.

2. Fly the helicopter into the straightaway, downwind of the landing area, at 300 feet above obstacles, maintaining 50 knots. As the helicopter approaches the required constant angle approach path, increase the nose attitude as required to arrive over the obstacle just short of the landing area with translational lift, if possible, and adequate clearance. As the helicopter passes the obstacle, adjust collective, keeping rate of descent under firm control. Transition into a hover or use a no hover landing as terrain permits.

CAUTION

Avoid steep descents, as a greater amount of torque will be required to land safely and the possibility exists of inducing power settling or settling with power.

CAUTION

Due to the size and configuration of the helicopter, adequate visual reference between the obstacle and the helicopter's tail rotor will be lost. If the main rotor blades, tail rotor blades, or the helicopter are damaged, land as soon as safely practical and have maintenance personnel inspect prior to further flight.

SLOPE LANDINGS

When hovering over a slope, the amount of ground effect is less than when hovering over level ground. The percentage of ground effect lost will vary with the degree of slope. Prior to landing on slopes the parking brake should be applied and the nosewheel LOCKED to prevent the aircraft from rolling or turning. Ground contact should be made using a vertical descent. Sideward motion of the nosewheels should be avoided to prevent breaking the nosewheel lock.

Landings on slopes up to approximately 4° differ very little from normal level landings, and any direction of landing may be accomplished. On slopes greater than 4°, a cross-slope landing with the right side upslope is recommended whenever possible. The normal left side low hover attitude makes this type landing easier to accomplish than in other directions. If a right side upslope landing is not possible, the following order of preference in landing is recommended: Nose upslope, left side upslope, and nose downslope. Nose downslope landings should be avoided due to danger of ground contact by the tail pylon. Takeoffs and landings should be accomplished with smooth positive control movements to permit stopping or aborting the maneuver at any time. The helicopter will have a tendency to slide downslope slightly during landings, however rapid or excessive control movement should not be used to eliminate this characteristic. Proper cyclic trim position for takeoff will be retained if the trim is not adjusted after landing.

WARNING

Avoid using a combination of excessive cyclic and low collective setting. During slope operations with the AFCS engaged, cyclic control inputs will be induced by the AFCS due to fuselage attitude changes. These inputs will be in a direction to hold the helicopter on the slope but will reduce rotor-to-fuselage and rotor-to-ground clearance. If a large cyclic control movement or rapid reduction of collective is applied, excessive rotor blade flapping may occur. If the cyclic control is near the fore or aft position and the collective is lowered rapidly the rotor blades may flex or dip sufficiently for the blades to contact the aircraft.

Cross-Slope Operations

After the upslope wheel is on the ground use smooth control inputs to maintain a near level attitude. Reduce collective to place the nosewheels on the ground and further reduce collective to lower the downslope wheel to the ground. As the collective is reduced, additional lateral cyclic control may be used to help control the rate of roll; however, avoid over controlling that could result in rotor blade contact with obstructions on the upslope side of the aircraft. After the helicopter is firmly on the ground, decrease the collective to full down. To takeoff from a cross-slope, slowly increase collective to bring the helicopter to a level attitude before breaking clear of the ground. The helicopter will normally roll towards the downslope side just as the last wheel breaks ground and a large upslope lateral cyclic input should not be used to avoid reducing rotor to ground clearance on the upslope side.

Nose Upslope Operations

Use a normal vertical rate of descent until the nosewheels contact the ground. As the nosewheels touch, slow the rate of descent slightly and use a small (about 1 inch) forward cyclic input to hold the nosewheels firmly on the ground as the strut compresses. Then lower the main wheels at normal rate of descent by reducing collective to the full down position. When the slope is near the limit of 8°, there will be more of a tendency for the helicopter to roll down hill as the main wheels descend; however, the roll is normally negligible. Use extreme care in applying additional forward cyclic as it could result in rotor blade to fuselage contact as the collective is lowered. After the initial forward cyclic input to get the nosewheels firmly on the ground only very small inputs (1/8 to 1/4 inch) are required to stabilize the pitch and roll attitude.

Takeoff is accomplished by increasing collective to establish a level attitude as the nosewheels break clear of the ground. The cyclic control is used only to stabilize the attitude and not to lift the main wheels off the ground.

Nose Downslope Operations

CAUTION

Downslope landings are to be avoided because of the danger of ground contact with the tail pylon.

The aft ramp may be opened enough to permit a crewmember to observe and report tail pylon and rotor clearance. However, if the ramp is opened to the level position, its ground clearance will also be critical at near maximum slopes or on uneven terrain. While descending vertically, and as the main wheels touch down, the cyclic stick should be held essentially fixed, using only small stabilizing inputs, to prevent rotating the tail into the ground. The collective is then decreased to lower the nosewheels to the ground. There is very little tendency for the helicopter to slide, or to roll if brakes are applied before landing. Takeoff is accomplished by increasing collective to establish a level attitude. As the main wheels break ground, there is a tendency for the helicopter to move forward. Extreme caution must be used if this movement must be stopped since any aft cyclic input may rotate the tail into the ground. If possible, it is best to let the helicopter move forward with little or no aft cyclic input until well clear of the ground. If this is not possible, a crisp and positive vertical rate of climb should be used from just before main wheels lift-off until well clear of the ground.

MOUNTAIN FLYING

Helicopter missions may require flight and landings in mountainous terrain. Refined flying techniques along with complete and precise knowledge of the individual problems to be encountered are required.

The effects of mountains and vegetation can greatly vary wind conditions and temperatures.

Helicopter pilots must be constantly alert to evaluate and avoid areas of severe turbulence; however, if encountered, immediate steps must be taken to avoid continued flight through it to preclude the structural limits of the helicopter being exceeded.

The most frequently encountered type of turbulence is orographic turbulance. It can be dangerous if severe and is normally associated with updrafts and downdrafts. It is created by moving air being lifted by natural or manmade obstructions. It is most prevalent in mountainous regions and is always present in mountains if there is a surface wind. Orographic turbulence is directly proportional to the wind velocity. It is found on the upwind side of slopes and ridges near the tops and extending down the downwind slope (figure 2-15). It will always be found on the tops of ridges associated with updrafts on the upwind side and downwind drafts on the downwind side. Its extent on the downwind slope depends on the strength of the wind and the steepness of the slope. If the wind is fairly strong (15 to 20 knots) and the slope is steep, the wind will have a tendency to blow off the slope and not follow it down; however, there will still be some tendency to follow the slope. In this situation, there will probably be a severe turbulence several hundred yards downwind of the ridge at a level just below the top. Under certain atmospheric conditions, a cloud may be observed at this point. On more gentle slopes the turbulence will follow down the slope, but will be more severe near the top. Orographic turbulence will be affected by other factors. The intensity will not be as great when climbing a smooth surface as when climbing a rough surface. It will not follow sharp contours as readily as gentle contours.

When the wind blows across a narrow canyon or gorge (figure 2-16) it will often veer down into the canyon. Turbulence will be found near the middle and downwind side of the canyon or gorge. When a helicopter is being operated at or near its service ceiling and a downdraft of more than 1.6 feet per second is encountered, the helicopter will descend. Although the downdraft does not continue to the ground, a rate-of-descent may be established to such magnitude that the helicopter will continue descending and crash even though the helicopter is no longer affected by the downdraft. Therefore, the procedure for transiting a mountain pass shall be to fly close aboard that side of the pass or canyon which affords an upslope wind. This procedure not only provides additional lift but also provides a readily available means of exit in case of emergency. Maximum turning space is available and a turn into the wind is also a turn to lower terrain. The often used procedure for flying through the middle of a pass to avoid mountains invites disaster. This is frequently the area of greatest turbulence (figure 2-17) and in case of emergency, the pilot has little or no opportunity to turn back due to insufficient turning space. Rising air currents created by surface heating causes convective turbulence. This is most prevalent over bare areas. Convective turbulence is normally found at a relatively low height above the terrain, generally below 2000 feet. It may, however, under certain conditions, and in certain areas, reach as high as 8000 feet above the terrain. Attempting to fly over convective turbulence

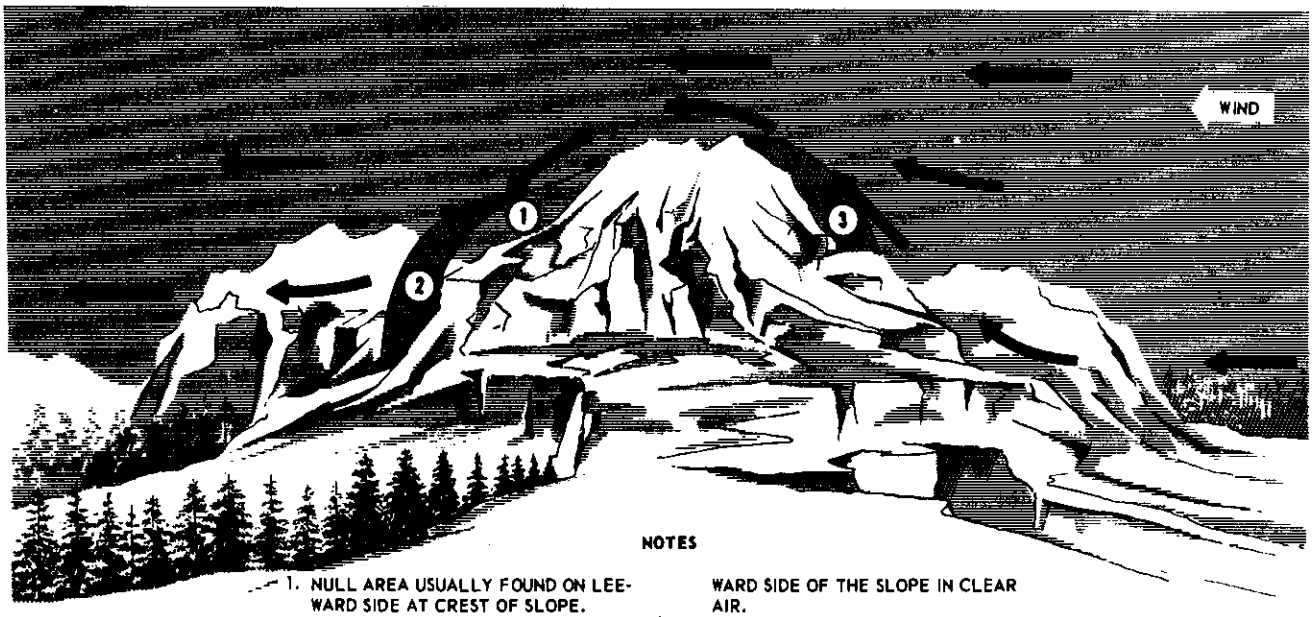


Figure 2-15. Wind Flow Over and Around Peaks

should be carefully considered, depending on the mission assigned. The best method is to fly at the lowest altitude consistent with safety. Attempt to keep your flight path over areas covered with vegetation. Turbulence can be anticipated when transiting from bare areas to areas covered by vegetation or snow. Convective turbulence seldom gets severe enough to cause structural damage.

When flying in and around mountainous terrain under adverse weather conditions, it should be remembered that the possibility of inadvertent entry into clouds is ever present.

Air currents are unpredictable and may cause cloud formations to shift rapidly. Since depth perception is poor with relation to distance from cloud formation and to cloud movement, low hanging clouds and scud should be given a wide berth at all times. In addition

Figure 2-16. Wind Flow Over Gorge or Canyon

to being well briefed, the pilot should carefully study the route to be flown. A careful check of the helicopter compass should be maintained in order to fly a true heading if the occasion demands.

SUMMARY

The following guidelines are considered to be most important for mountain terrain flying.

1. Make a continuous check of wind direction and estimated velocity.

2. Watch for rpm surges during turbulent conditions. Strong updrafts will cause rpm to increase, whereas downdrafts will cause rpm to decrease.

3. Fly as smoothly as possible and avoid steep turns.

4. Cross mountain peaks and ridges high enough to stay out of downdrafts on the lee-side of the crest.

5. Avoid downdrafts prevalent on leeward slopes.

6. Plan your flight to take advantages of the updrafts on the windward slopes.

7. Whenever possible, approaches to ridges should be along the ridge rather than prependicular. Stay to the updraft side of the ridge with the wind off the right side (figures 2-18 and 2-19).

8. Know your route and brief well for flying in these areas.

NIGHTSUN SEARCHLIGHT OPERATIONS

Preflight

1. Lens clean - CHECKED.

NOTE

Do not touch the lens with hands; smudges may cause an uneven heating of the lens and subsequent cracking.

2. Light - MANUALLY POSITIONED so beam will NOT STRIKE HELICOPTER WHEN ILLUMINATED.

3. MASTER switch - OFF.

4. Circuit breakers - CHECKED.

Starting

1. MASTER switch - ON.

2. START switch - DEPRESS UNTIL LAMP IGNITES (5-10 seconds).

CAUTION

Continuing to depress the switch after ignition may seriously damage the searchlight.

Operation

1. FOCUS switch - ADJUSTED TO DESIRED BEAM WIDTH.

2. Direction control switch - OPERATE AS DESIRED.

NOTE

When the controllable searchlight is OFF or in STOW, the collective searchlight position control switches and the searchlight position toggle switch, on the copilot's remote ICS panel, controls the Nightsun positioning.

Securing

1. Pushbutton (top of Remote Control Unit) - DEPRESS UNTIL SEARCHLIGHT EXTINGUISHES.

2. Allow a minimum of 3-5 minutes for cooling.

3. MASTER switch - OFF.

OPERATING TECHNIQUES

Techniques for use of the searchlight will vary with the object of the search, area being searched, and the meteorological conditions. General guidelines for its use are listed below:

1. Search Airspeed. It is recommended that search airspeeds of 50-100 knots be maintained as required

Figure 2-17. Wind Flow in Valley or Canyon

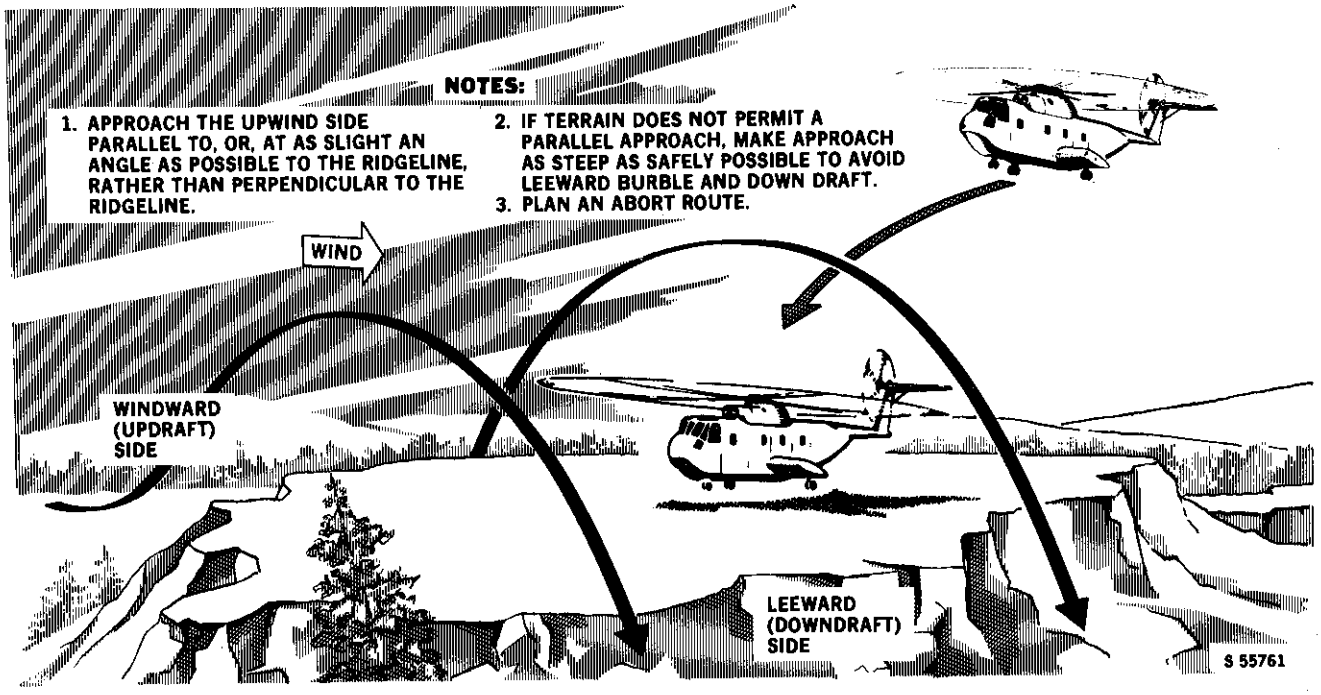


Figure 2-18. Wind Effect on Ridgeline Approach

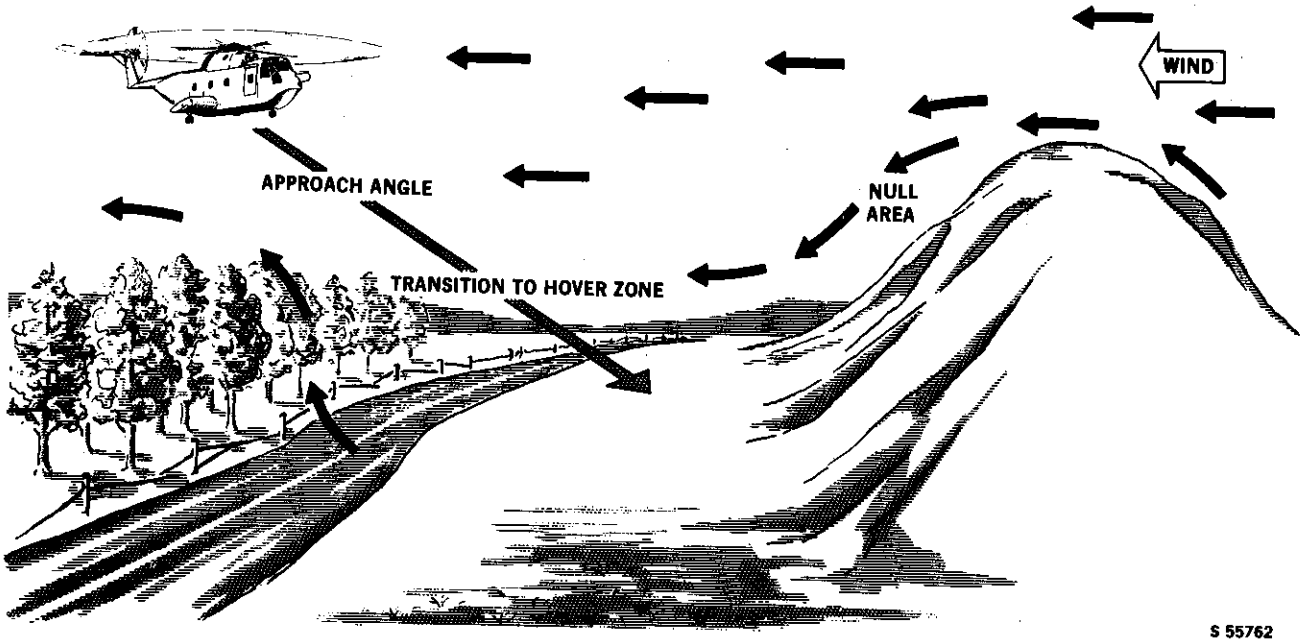


Figure 2-19. Wind Effect in a Confined Area

for the type of object being searched for and the area to be covered. The Nightsun has been designed to operate at airspeeds corresponding to helicopter limitations.

2. Altitude. Proportional to search object's size. The following examples are given for guidance:

a. Vessels or boats 40 feet or over - 1000-1500 feet.

b. Boats less than 40 feet - 300-1000 feet.

c. Personnel - 300-500 feet.

CAUTION

Water landings with the searchlight installed shall be limited to operational necessities. If a water landing is necessary and the Nightsun is in use, turn the light off and allow it to cool prior to landing (3-5 minutes are recommended; however, any cooling period is beneficial). The MASTER switch shall be secured prior to water contact. Water landings with any forward speed may cause damage to the Nightsun mounting and aircraft mounting points.

CAUTION

The Nightsun may also be used satisfactorily for a hover search. However, it is recommended that hover conditions resulting in water spray around the Nightsun be kept to a minumum to preclude ingestion of water/salt spray by the cooling fan.

3. Beam Width. Adjust as desired.

4. Search Stations. The port side of the helicopter is the recommended search side and can be used effectively by the copilot and avionicsman. The copilot can maintain directional control of the Nightsun with either the collective searchlight position control switch or the searchlight position toggle switch on the remote ICS panel. The avionicsman can start, focus, change direction, or secure the Nightsun by using the remote control box. The control box, mounted on the starboard side of the helicopter, has enough cable to allow it to be used in the avionics position.

CAUTION

When operating the remote control box from the avionics position, the power extension cable lying across the cabin deck may be a hazard during an emergency exit.

It is recommended that the Nightsun not be used to search on the starboard side of the helicopter due to the possibility of the light striking the helicopter.

WARNING

The heat generated by the light is capable of melting a tire or igniting paint or fiber glass.

5. Safety Considerations. Care should be taken when operating the Nightsun during fog, haze, or snow, when visibility may be reduced to zero. At that time, the helicopter should be flown entirely by instruments at a safe instrument altitude.

The Nightsun may be used to assist in position holding during hovering by shining it down toward the water. However, when the light is used in this manner, caution should be used since the light will shine down into water (below the surface), possibly creating a false altitude sensation, which may increase the potential for spatial disorientation.

WARNING

When operating close to personnel, the light beam should never be directed towards them since the high intensity of the beam may cause burns or eye injuries.

AIR DELIVERABLE ANTI-POLLUTION TRANSFER SYSTEM (ADAPTS)

ADAPTS

The ADAPTS Type II pumping subsystem can be succesfully delivered to confined areas of vessels in distress by use of the presently installed rescue hoist. The carrying of the ADAPTS internally assumes a certain degree of risk since the equipment cannot be secured to provide crash protection for the aircraft and crew. With this consideration in mind it is recommended that when the ADAPTS is to be deployed the following methods of delivery be thoroughly explored prior to carrying the ADAPTS internally in the helicopter.

a. Surface transportation

b. External cargo sling

The air deliverable anti-pollution transfer system consists of the following deliverable items (figure 2-20):

ITEM	APPROXIMATE WEIGHT
1. Pump	920 lbs
2. Prime-mover	1150 lbs
3. Equipment Box	200 lbs
4. Full Fuel Bag	475 lbs
5. Hose Boxes	EA 150 lbs
6. Tripod	170 lbs
7. Strike Team Member with Equipment	EA 200 lbs

The actual weight of these items will vary as minor changes are made to the equipment. Each item has the actual weight stenciled on its container. Actual weight should be used for weight and balance and TOLD calculations. The number of men in the strike team will vary from four to six men; each man will have about 20 pounds of personal equipment. A minimum of 150 feet of hose will be required; each hose box contains 50 feet of hose.

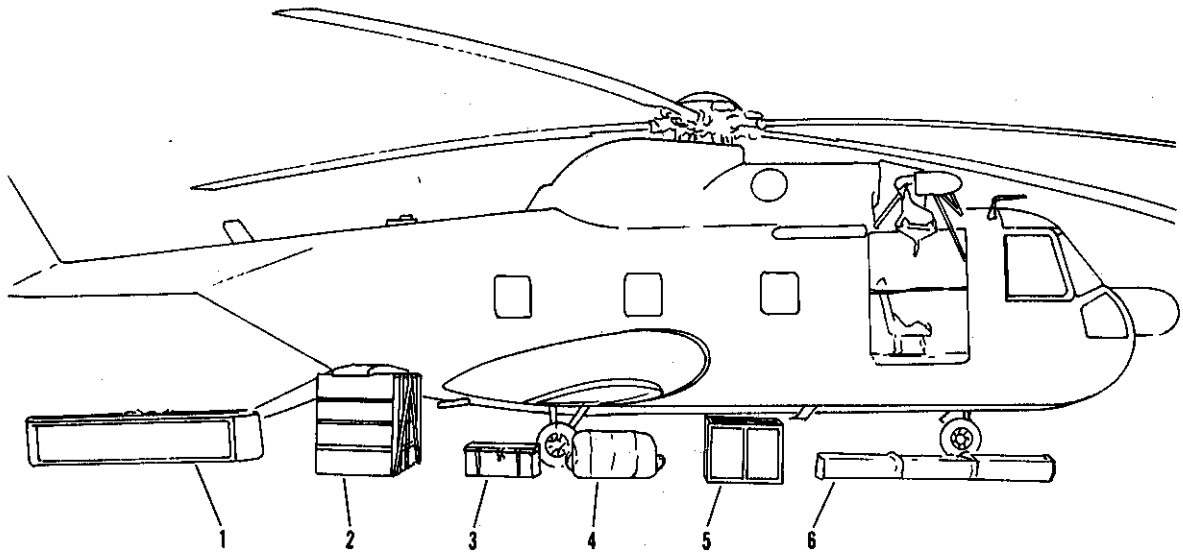
The following equipment must be installed in the aircraft to deliver the pump and prime-mover:

ITEM	WEIGHT
1. Hoist Supports	EA 3 lbs
2. Dual Sheave Block	35 lbs
3. Rollers	39 lbs

PREFLIGHT PLANNING

The basic assumption for the following procedures is that one aircraft has been assigned to the mission. At least two loads will be required to deliver the strike team and the pumping system. The specific items carried on each load may have to be varied so that the on-scene weight of the aircraft is below maximum gross weight to HOGE. A weight and balance and a TOLD card shall be calculated for each load.

The strike team members and their personal equipment will be delivered first along with whatever other items the aircraft is able to carry (hoses, tripod, fuel bag, etc.). The strike team is delivered first in order to have qualified people disconnecting subsequent equipment loads.



1. PUMP
2. PRIME - MOVER
3. EQUIPMENT BOX
4. FULL FUEL BAG
5. HOSE BOX
6. TRIPOD

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Figure 2-20. ADAPTS Equipment

WARNING

Under no circumstances will the dual sheave block be used to deliver personnel. First trip items should be limited to 600 pounds.

Having delivered the strike team, or at least a portion thereof, the pump and prime-mover will be loaded and delivered next, using the dual sheave block.

PREFLIGHT OF ADAPTS INSTALLATION

Refer to figures 2-21 and 2-22.

1. Roller assembly installed.
2. Dual sheave block installed.
3. Second guillotine installed.
4. Uplimit bumper installed on forward end of dual sheave.
5. Additional hoist supports installed.
6. Door removed.
7. Pump securely attached to bomb rack.
8. Pump cables attached to dual sheave block.
9. Prime-mover secured with cargo straps.
10. Prime-mover skids snug against stops.
11. Ensure gunner's belts onboard for each crewman involved in delivery.
12. All other equipment to be carried secured.

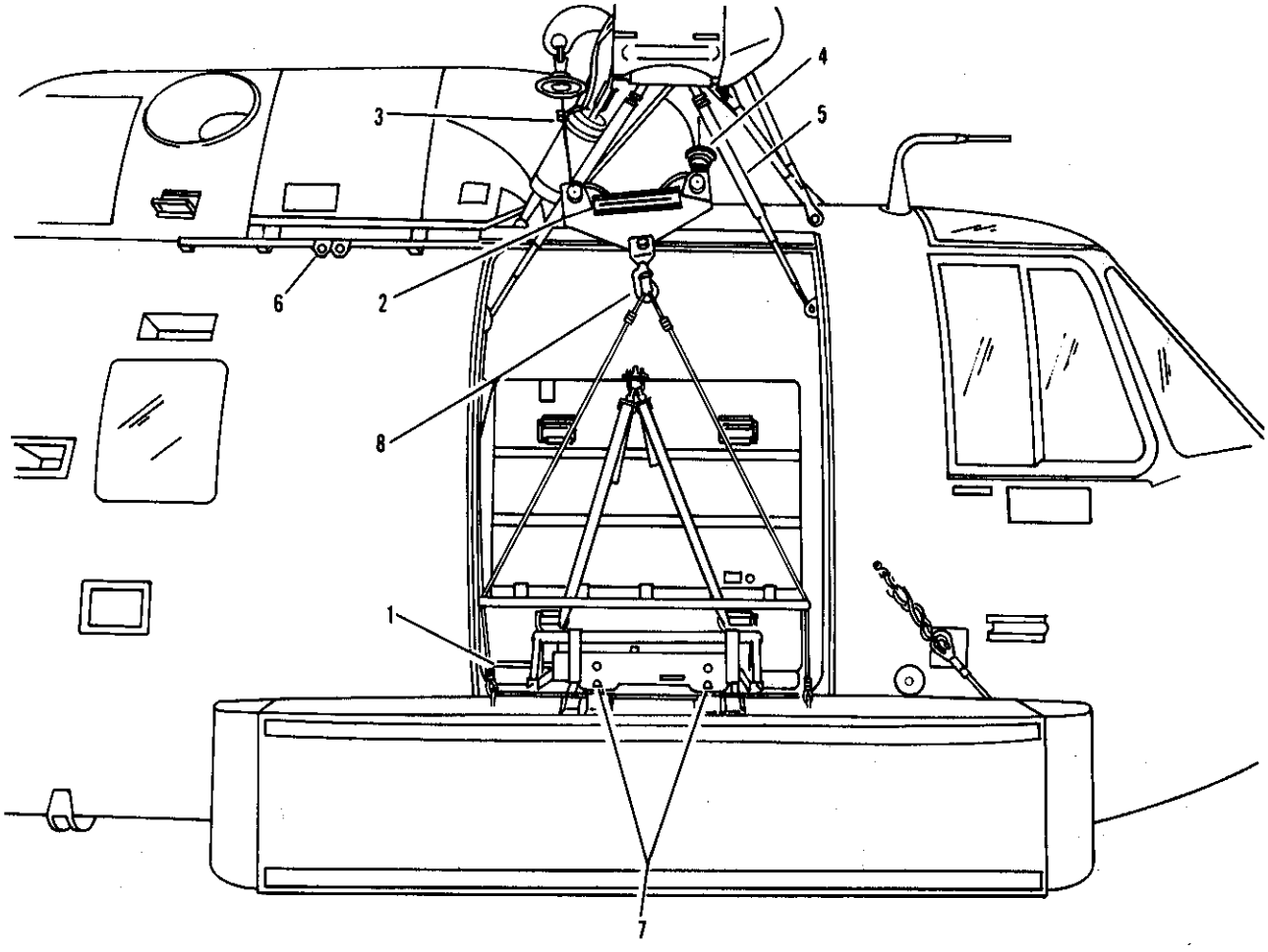
AIRCRAFT LOADING

1. Load all or a portion of the strike team members and their personal gear. Load any other equipment (except pump and prime-mover) that the aircraft is able to carry and still HOGE on scene. Any equipment loaded through the aft portion of the aircraft shall be accomplished with both the forward and aft ramps in the full down position. The fuel bladder will be loaded using the hoist.

CAUTION

Attach the hoist to the D ring on either end of the bladder, not to the lines that are attached to the D rings. All items shall be secured prior to takeoff.

2. Prime-mover and pump.



1. ROLLER ASSEMBLY
2. DUAL SHEAVE BLOCK
3. SECOND GUILLOTINE
4. UPLIMIT BUMPER ON FORWARD END OF DUAL SHEAVE
5. ADDITIONAL HOIST SUPPORTS
6. DOOR REMOVED
7. PUMP SECURED TO BOMB RACK
8. PUMP CABLES ATTACHED TO DUAL SHEAVE BLOCK

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Figure 2-21. ADAPTS Handling Equipment (Exterior)

a. It is recommended that six people be used to load the prime-mover and pump, three inside the aircraft and three outside.

b. The ICS shall be manned at the hoist operator and forward external positions.

c. Person supervising loading operations ensure that items 1-6 of the preflight of ADAPTS installation have been completed.

d. Attach hoist to strongback of prime-mover.

e. Raise prime-mover to cargo door opening.

f. Secure cargo straps to attaching rings on prime-mover skids, not to handles.

g. Inside personnel keep tension on straps to prevent load from swinging out.

h. Outside personnel guide prime-mover onto rollers while pushing inward.

i. Slowly extend hoist cables as prime-mover enters cabin.

NOTE

Once prime-mover is in cabin, some slack should be left in cargo straps in order to facilitate loading of the pump.

j. Detach hoist from strongback.

k. Attach hoist to pump cables.

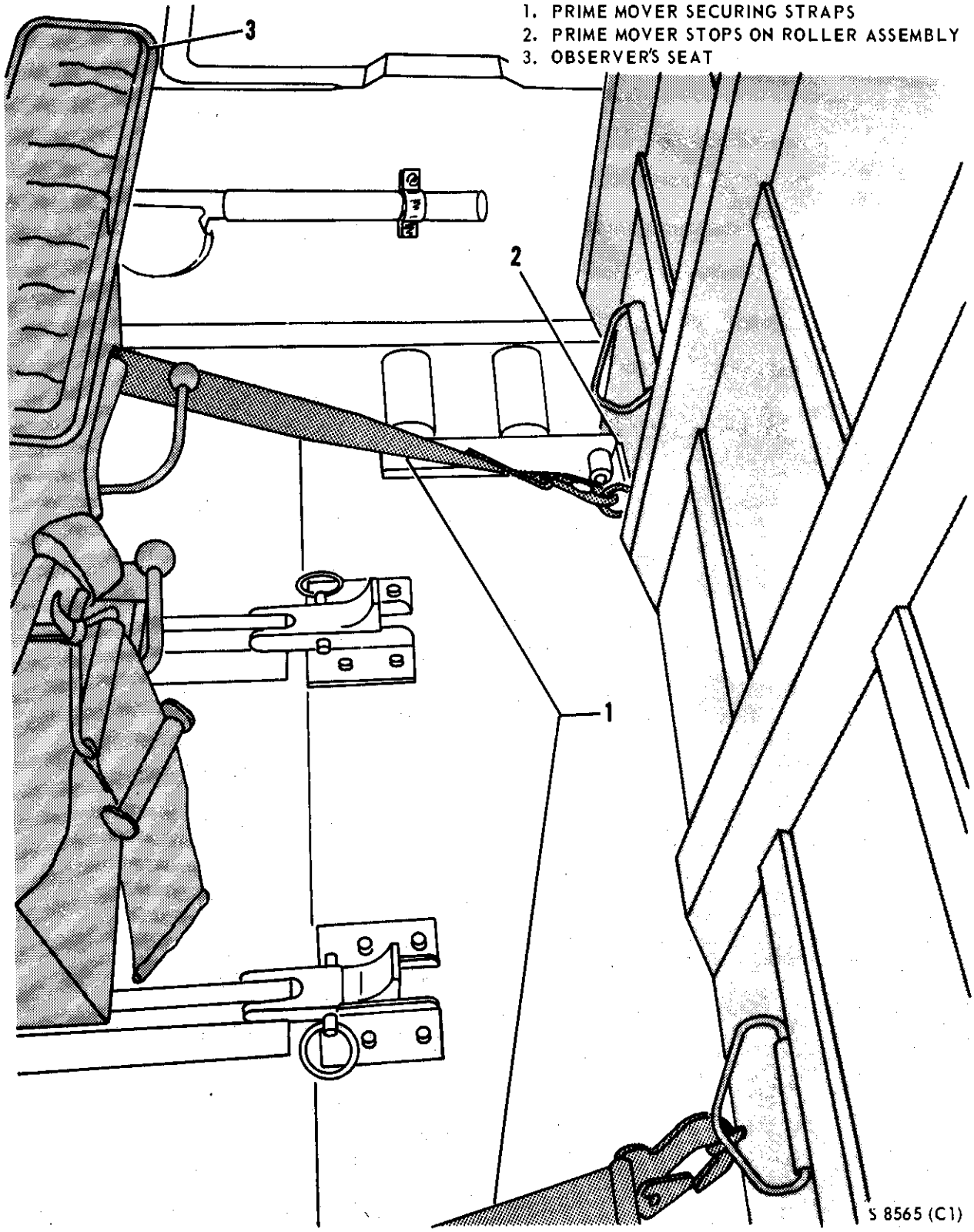

Figure 2-22. ADAPTS Handling Equipment (Interior)

NOTE

Pump will not lock into bomb rack if installed backwards.

l. Raise pump, with personnel outside guiding pump attaching points, into bomb rack locks.

m. Slacken hoist cable to ensure that pump is locked into bomb rack.

n. Remove slack from cable.

o. Remove slack from tiedowns, drawing prime-mover assembly fast against stops of roller track, utilizing tiedown strap ratchets.

3. All other equipment may be hoisted aboard the aircraft or loaded by hand.

DELIVERY OF PUMP AND PRIME-MOVER

1. Prior to arrival on scene, if possible, communications should be established with the strike team.

2. Upon arrival on scene, verify power available and power required to hover (figures of TOLD data).

3. Execute as many fly-bys of the ship as necessary to evaluate sea conditions and identify the area best suited for delivery.

4. Rebrief crew as necessary.

5. Crewman perform rescue checklist.

6. Approach will normally be made to an out-of-ground effect hover. Hover altitude should be high enough to permit decreasing altitude 5-10 feet during the final phase of delivery.

7. Direct crewman to release pump from bomb rack.

8. Hoist operator HOT MIKE when directed by pilot.

CAUTION

Hoist operator may lose visual contact with the target area until the pump is 3 to 5 feet below the aircraft.

9. Using normal procedures, hoist operator will lower pump to within 5 to 10 feet above target area.

10. Lower the pump to the deck by slowly decreasing the altitude of the aircraft as directed by the hoist operator.

NOTE

When the load contacts the deck a significant change in aircraft weight and center of gravity will occur. The above method of delivery will minimize the effects of these changes.

11. After the dual sheave block is retrieved and connected to the strongback on the prime-mover, release the ratcheting mechanisms on the cargo straps.

12. Direct hoist operator to ease prime-mover out of cabin door.

NOTE

To prevent rapid shifting of the load, the other crewman (men) will maintain a slight amount of tension on the cargo straps until the load is stabilized outside of the aircraft.

13. Disconnect cargo straps from prime-mover.

14. Deliver the prime-mover as outlined in steps 8 through 10 above.

DELIVERY OF ALL OTHER EQUIPMENT

All other equipment will be delivered using standard procedures.

DELIVERY OF PERSONNEL

If the subsequent lowering of personnel is required, the dual sheave block shall be removed.

ENGINE START WITH APU INOPERATIVE

Should the APU be inoperative, it may be possible to start the engines with ac or dc external power, or with battery power only. All dc-operated equipment not essential for engine start must be secured, either by turning off switches or pulling circuit breakers, to permit maximum utilization of available battery power to obtain maximum N_g for the engine start. One engine only should be started from the battery, and **ROTOR ENGAGEMENT WITH APU INOPERATIVE** procedures in this section must be followed.

Paralleling Batteries

In the event that the battery voltage is so low that a battery start cannot be accomplished, an additional source of battery power may be connected in parallel with the installed battery, either at the battery or through the dc external power receptacle.

Battery Start Procedure

NOTE

Pilots shall refer to this section when using this procedure.

1. Rotor brake - ON.

2. Battery switch - OFF.

3. Accomplish all items in **BEFORE STARTING ENGINES** check, section II that require no electrical power. Leave off all unnecessary equipment.

4. Start mode switch - MANUAL.

5. Battery switch - ON.

CAUTION

The engine fire detection system is inoperative until the generators are on the line.

6. No. 1 engine - START. To start the engine, hold the speed selector in SHUT-OFF position and momentarily depress the starter button. Motor the engine for a minimum of 10 seconds and until T5 is below 100°C; advance the speed selector to the ground idle detent at a minimum of 13% Ng.

7. ENG ST button - Depress as necessary to control T5 and engine acceleration. When engine light-off is evident, depress the ENG ST button on the cyclic. Hold the button depressed as necessary until T5 stabilizes.

8. At approximately 45% Ng, starter - DISENGAGE. Disengage starter by pulling down on the speed selector lever.

9. All gages - CHECKED.

NOTE

Fuel flow, oil pressures and torque indications will not be available until the generators are on the line.

10. Continue with **ROTOR ENGAGEMENT WITH APU INOPERATIVE** procedures.

ROTOR ENGAGEMENT WITH APU INOPERATIVE

CAUTION

Do not engage rotor with APU inoperative and main transmission oil temperature below -6.7°C (20°F).

NOTE

This engagement procedure should be used only when absolutely necessary to complete the mission.

Should the APU be inoperative, and the No. 1 engine can be started by utilizing external power, or battery power, it is imperative that extreme caution be exercised when engaging the rotor head. The rotor brake should be ON as the number one engine is started. After the engine gages have stabilized in ground idle, release the rotor brake. At approximately 8% Nr, the transmission oil pressure should be above minimums required and servo pressure should be sufficient to operate the flight controls. As the rotor acceleration continues, utilize minimum torque. This procedure is necessary to preclude damage to the main transmission input sleeve bearing as a result of initial lack of lubrication and to minimize the possibility of a high speed section overtorque condition due to lack of torque indication associated with BATT or external DC power engagements. As the rotor builds up speed, the transmission oil pump supplies the required lubrication. The cyclic and collective must be held firmly, since a slight kickback may feed back into the controls as servo pressure builds up. After 103% Nr is obtained, EXT PWR switch OFF, disconnect the EXT PWR (if connected), move START MODE switch to normal and start the other engine. Match torques at 103% Nr, then conduct checklist items that have not already been accomplished.

CAUTION

If engine start was accomplished using BATT or DC external power, cockpit gauge indications of transmission oil pressure, servo pressures and torque pressure will not be available until the generators are on the line.

HOT REFUELING OPERATIONS

The following procedures describe refueling operations with the rotor system engaged and the No. 2 engine secured. Hot refueling presents safety concerns which are not normally encountered in other fueling operations. Because of the increased risk of fire, hot refueling shall be used only on those missions where such use will afford significant operational benefit. It is not intended that this procedure be used for routine missions or that the procedure be used when other means of fueling can meet the mission requirements. Personnel supervising and conducting hot refueling must have a thorough knowledge of the fueling equipment, the helicopter fuel system, the operational procedures for hot refueling, and the appropriate safety precautions. The aircraft commander is responsible for positioning the helicopter in the fueling area clear of all obstructions and for compliance with the hot refueling procedures. The flight mechanic will refuel the helicopter. He must make sure that the pressure refueling system used is compatible with the helicopter fuel system, that the proper type of fuel is received, and that the helicopter and single point refueling nozzle are properly grounded.

HOT REFUELING

NOTE

Pilots shall refer to this section when using this procedure.

NOTE

The No. 2 engine shall be secured as soon as possible after landing to maximize engine cooling and minimize the fire hazard during refueling. One of the following conditions must be met before securing the No. 2 engine; 1 minute at ground idle, 1 minute of taxiing or 1 minute of operation at, or above, the minimum governing range and with minimum collective pitch.

NOTE

When using pressure refueling, fuel cannot be selectively distributed. Pilots should be alert for possible changes in the helicopter CG due to non-standard fuel loadings. Additionally, particular attention should be paid to fuel management to ensure that the new fuel load is aligned and assessed as necessary.

1. No. 2 Engine Boost Pump - "OFF." (P) Copilot perform.

2. No. 2 Engine Ignition Switch - "OFF." (P) Copilot perform.

3. No. 2 Engine Speed Selector - "SHUT OFF." (P) Copilot perform.

4. No. 2 Engine Fuel Shutoff Valve Switch - "OFF." (CP)

5. Overhead Switch Panel - "CHECKED." (CP)

   a. No. 2 Engine Anti-ice - OFF.

   b. Cabin Heater Vent - NORM.

   c. Cabin Heater - OFF.

   d. Pitot Heat - OFF.

6. Radar Altimeter - "OFF." (P)(CP)

7. Center Console - "CHECKED." (CP)

   a. IFF - STBY.

   b. Ramp - Closed.

   c. Radar - STBY.

   d. Doppler - STBY.

   e. TACAN - REC.

8. Side Consoles - "CHECKED." (P)(CP)

   a. All ICS Rotary Selector Switches - INT.

9. HF Radio - "OFF." (AVI)(CP)

WARNING

Electromagnetic radiation including radio transmissions, radar, IFF, RADALT, and doppler are prohibited during the hot refueling operation. Actuation of electrical switches shall be restricted to those necessary for the refueling operation such as ICS communications.

10. Parking Brake - "SET." (P)

11. Chocks - "INSTALLED." (FM)

12. Windows and Doors - "CHECKED." (P)(CP)(FM)

a. Cockpit Windows - Closed.

b. Cargo Door - Open.

NOTE

The cargo door will remain open to permit rapid exit of the crew in case of an emergency while refueling.

13. Refueling Unit - Positioned.

NOTE

Movable refueling units shall be positioned as far from the helicopter as the hose will permit, and in a position so that it may be quickly moved away in case of fire. This means the refueler shall be parked on the right side of the helicopter and parallel to the helicopter heading.

14. Ground Static Wires - "ATTACHED." (FM)

a. Helicopter - Grounded.

b. Refueling Unit - Grounded.

c. Helicopter to Refueling Unit - Bonded.

d. Fuel Nozzle to Helicopter - Grounded.

15. Fireguard - "POSTED." (FM)

WARNING

Hot refueling introduces greater fire hazards than encountered during normal fueling because of ignition sources. Consequently, greater fire protection is needed. A twin-agent fire fighting unit is the preferred protection. The minimum acceptable protection is a manned 50-pound dry chemical extinguisher. If this minimum fire protection is not available, or if the grounding requirements cannot be met, hot refueling shall not be attempted.

16. Fuel Flow - "ESTABLISHED." (FM)

17. Primary and Secondary Shutoff Checks - "COMPLETED." (FM)

CAUTION

If the fuel flow does not stop when either the primary or secondary checks are made, it indicates a fuel system malfunction, and refueling shall be terminated.

NOTE

Refuel at a flow rate not to be over 150 gpm or 50 psi.

18. Fuel Flow - "STOPPED." (FM)

19. Pressure Fueling Nozzle - "DISCONNECTED." (FM)

20. Ground Static Wires - "DISCONNECTED." (FM)

NOTE

If a movable refueling unit was not used, complete the BEFORE TAXI checklist and taxi clear of the refueling area before restarting the No. 2 engine.

ENGINE RESTART

1. Refueling Unit - "CLEAR." (FM)

2. Parking Brake - "SET." (P)

3. No. 2 Engine Ignition Switch - "NORM." (CP)

4. No. 2 Engine Fuel Shutoff Valve Switch - "OPEN." (CP)

5. No. 2 Engine Boost Pump - "ON." (CP)

6. No. 2 Engine - "FIREGUARD POSTED" (FM); "STARTING." (CP)

a. Do normal engine starting procedures.

7. Speed Selectors - "103%" (P) Copilot Perform.

8. Center Console - "CHECKED." (CP)

a. TACAN - As desired.

b. Doppler - STBY.

c. Radar - STBY.

d. IFF - STBY.

9. Radar Altimeter - "ON." (P), (CP)

10. HF Radio - "ON." (CP), (AVI)

11. Fire Extinguisher - "CLEAR." (FM) Do "BEFORE TAXI" checklist.

SHIPBOARD-HELICOPTER OPERATIONS.

Shipboard-helicopter operations require a great deal of coordination between the crew of the helicopter and the ship's personnel. Pilots contemplating ship-helicopter operations shall refer to the Shipboard-Helicopter Operational Procedures Manual (CG-419).

PRACTICE EMERGENCY PROCEDURES

PRACTICE EMERGENCY FUEL CONTROL LEVER OPERATIONS

With the helicopter either airborne or on the ground, retard one speed selector to 100% Nf. Slowly advance the emergency fuel control lever for that engine until torques are matched. A maximum spread of 10% torque between engines is desirable.

NOTE

Operating both engines on emergency fuel control lever at the same time, for training purposes, is prohibited.

NOTE

Practice emergency fuel control lever operations, when practiced to a landing, shall be conducted to a prepared surface where crash equipment is available.

PRACTICE SINGLE-ENGINE LANDINGS

Practice single-engine approach and landings on land or water may be performed in the same manner as described under **SINGLE-ENGINE FAILURES.** Single-engine failure is simulated by retarding either speed selector to the maximum Nf that will result in zero torque on that engine.

NOTE

Practice single-engine land operations shall be conducted to runways or taxiways where crash equipment is available.

PRACTICE DUAL-ENGINE FAILURE DURING FLIGHT (AUTOROTATION)

Practice dual-engine failure during flight may be performed utilizing the following procedure: After accomplishing a thorough briefing and the Before Landing Checklist, the pilot flying the aircraft will reduce the collective to minimum and instruct the other pilot to retard the speed selectors to the maximum % Nf that will result in zero torque on both engines. This will effect a clean Nf/Nr split. The pilot handling the speed selectors will keep his hand on them at all times during the autorotation to assure a power recovery can be made at any time during the manuever. After entering autorotation, maintain 70 - 110 KIAS airspeed until 200 feet AGL.

NOTE

Under certain light gross weights and low temperature, rotor speeds may not build up to 100% Nr.

At 200 feet AGL, initiate a gradual flare while maintaining rotor RPM within limits throughout the maneuver by use of the collective. The pilot monitoring the speed selectors will smoothly advance both speed selectors full forward prior to exiting the flare. A power recovery will then be accomplished. All practice autorotations shall be conducted in DAY-VFR conditions to runways or taxiways where crash equipment is readily available and shall be terminated in a power recovery, level flight attitude, less than 30 knots ground speed, and at an altitude of 10 to 15 feet. All practice autorotations shall be entered from an altitude no less than 700 feet AGL, and at a gross weight not to be over 19,500 pounds.

PRACTICE TAIL ROTOR CONTROL LINKAGE FAILURE

(LOSS OF LEFT AND RIGHT PEDAL CONTROL)

Practicing flight with simulation of tail rotor control failure may be performed utilizing the following procedure: After accomplishing a thorough briefing and the Before Landing Checklist, (including the speed selectors - full forward) pilot in the left seat will take control of the aircraft at altitude and have the pilot in the right seat secure the yaw channel of the AFCS. The pilot designated as safety pilot will now take control of the aircraft, secure the aux servo while guarding the tail rotor control pedals and allow NFG spring to position the pedals. Once the pedals are positioned, the safety pilot will hold the pedals in position with his feet throughout the maneuver. The safety pilot will now turn the aux servo on, give the other pilot control and have him fly the aircraft with his feet off the pedals. The pilot may experiment with various airspeed and power combinations while at altitude in order to

obtain an airspeed/power setting which allows him to maintain heading, have a slight rate of descent, with airspeed slow enough to allow a running landing. The maneuver may be terminated with a landing if feasible for existing conditions. A wave-off may be executed at any time the maneuver appears unsafe by the safety pilot operating the pedals in a normal manner.

CAUTION

Experience has shown that pilots can become distracted and forget the landing checklist when performing this maneuver. Ensure that the wheels are DOWN and the speed selectors full forward before starting the maneuver.

NOTE

Practice tail rotor control linkage malfunctions shall be conducted to runways or taxiways where crash equipment is available.

CAUTION

Use extreme caution while applying pedal brakes to control heading after touchdown. With the collective up and little weight on the tires, light brake application may be sufficient to lock the wheels and cause tire blowout.