CHAPTER 11: CARGO TRANSPORT

I. Introduction.

When cargo is transported incorrectly, there is the potential for dropped external loads, hazardous materials spillage in the helicopter, overgrossed aircraft, cargo interference with the rotor systems, or other serious safety hazards. Incorrect methods of rigging and transporting cargo has resulted in catastrophic accidents. Use of the standard procedures outlined in this chapter will facilitate a safe and efficient cargo operation.

A. Longline Operations

1. Risk: The first thing to consider prior to any mission.
   
   Complete risk analysis is a must prior to deciding how a mission is to be accomplished, what equipment is to be used, and if the pilot and helicopter are correct for the job.

2. Height-Velocity Curve: What it means to the Pilot, Ground Crew and management.
   
   If a helicopter has a catastrophic engine failure while hovering at 100 feet AGL, it will contact the ground in approximately 2.5 seconds at a speed of 50 miles per hour, or 67 feet per second. Keep alert while working under a helicopter doing longline work!
II. Qualified Personnel.

A. Ground Personnel.

Helicopter and helibase management personnel must be trained and qualified to supervise and coordinate cargo transport activities on incidents or projects per the requirements found in Chapter 2, Chart 2-3.

Trained personnel should be provided at all loading and unloading sites. Any exceptions (for example, longline with remote electric hook transport) are noted in this chapter.

The following minimums are recommended for handling cargo transport (note that these are not related to the minimum fire helicopter staffing level requirements in Chapter 2):

- Four persons for Type 1 and 2 helicopters.
- Three persons per Type 3 helicopter.

These minimums provide for a Parking Tender, Loadmaster(s), and hook-up person.

B. Pilot Qualification.

The Pilot must be qualified for carriage of external loads and, if applicable, for longline (vertical reference).

III. Load Calculations and Manifesting.

During cargo transport operations, load calculations shall be performed prior to any flight activity. Weight of cargo is usually indicated either on the load calculation form or, if manifesting multiple trips under one load calculation, on the manifest form. Refer to Chapter 7, Load Calculations and Manifests, and to Appendix A Forms for detailed information and instructions.

IV. Air Crew Member on Board During External Load Missions.

An air crew member (for example, the Helicopter Manager) is allowed on board during external load operations, provided certain conditions exist or are met. See Chapter 10, Section IV for further information.

V. Hazardous Materials Transport and Handling.

A list of hazardous materials is contained in 49 CFR 172.101, Department of Transportation, Hazardous Materials Table. Some hazardous cargo may be transported via helicopters under special conditions. See 49 CFR.
A list of common hazardous materials, along with the correct transportation procedure for each, can be found in the *Interagency Aviation Transport of Hazardous Materials Guide/Handbook* (for USFS and OAS), or in local or state agency policy.

A. Exemptions.

USFS and DOI both have an exemption granted by the United States Department of Transportation (DOT). It exempts USFS and DOI from certain hazardous materials regulations, provided that the materials are transported in conformance with the *Interagency Aviation Transport of Hazardous Materials Guide/Handbook*. ¹ If an agency does not have an exemption from DOT, then all materials must be transported in accordance with 49 CFR Parts 171-175.

B. Requirements.

- Aviation transport of hazardous materials must conform to procedures contained in the *Aviation Transport of Hazardous Materials Guide or Handbook*.
- Personnel, including vendors, who engage in the transport of hazardous materials via aircraft must have been trained in Hazmat. They must carry a current letter of exemption, an *Interagency Aviation Transport of Hazardous Materials Guide or Handbook* and an *Emergency Response Guide* on board the aircraft at all times.

C. Transport and Handling During Law Enforcement.

See Chapter 16.

VI. Cargo Transport with Military Aircraft.

External sling load missions may not be possible or practical for all military helicopters for the following reasons:

- Military helicopters may not be equipped with cargo hooks.
- The sling equipment currently used by civilian fire agencies may not be readily adaptable for use on military equipment.

If military helicopters are tasked to perform external cargo transport, use military sling equipment and qualified military personnel. Military personnel engaged in external load operations must be furnished with and wear personal protective equipment according to the requirements found in Chapter 9, Chart 9-2.

¹USFS and OAS publish aviation hazardous materials transport directives. However, with the exception of references to the agency name, language and procedures are the same. The directives are also based upon the same exemption granted these agencies by the United States Department of Transportation. Local and state agencies may have similar direction.
For aviation operations using Active Duty or Reserve Military helicopters, and National Guard units officially “federalized,” refer to Chapter 70 of the Military Use Handbook for specific policy and procedural information.

The use of National Guard units for federal firefighting purposes within their state must be outlined in national, regional, state or local agreements and Memorandums of Understanding (MOUs) between federal agencies and the specific National Guard units.

VII. Cargo Preparation.

Correct cargo preparation is essential to safe completion of the mission.

A. Pilot Approval.

Obtain Pilot approval of all cargo to be transported. Loadmasters and other personnel loading cargo must always inform the Pilot of:

- Hazardous material(s) being transported;
- Packaging of the hazardous material. Has it been correctly packaged and placed in the helicopter in conformance with the Interagency Aviation Transport of Hazardous Materials Guide or Handbook or 49 CFR Parts 171-175?

B. Weighing.

Exhibit 11-1 shows various methods of weighing cargo. Portable scales can be easily set up at remote helibases and helispots. Weigh cargo and inform the Pilot of actual weights. DO NOT EXCEED ALLOWABLE PAYLOAD. If possible, have the cargo weighed, packaged, and marked for destination prior to the arrival of the helicopter.
C. Methods of Identifying Cargo Destinations.

When a cargo transport operation involves multiple drop off locations, each cargo load should be marked with its destination to ensure it reaches the correct location.

The following are suggested methods:

- Lay out separate cargo areas for each helispot. Identify these areas with markers: “H1”, “H2”, etc. Note that these do not have to be separate cargo pads.
- At the minimum, have the Loadmaster or Supply Unit mark destination clearly on the cargo using a heavy marker, or tag each piece.

VIII. Equipment Inspection.

Prior to the operation, the Helicopter Manager, Loadmaster, or other responsible person should inspect all equipment (e.g., leadlines, swivels, nets, cargo racks, tie-down straps) in accordance with the procedures found in Chapter 9.

IX. Cargo Inspection.

Prior to the operation, the Helicopter Manager, Loadmaster, or other responsible person should inspect all cargo. Inspection should include, as applicable, the following:

- Liquid containers should be boxed or secured in an upright position.
- Boxes should be taped shut and all items tied down or secured, including Sigg and other fuel holding containers.
- All backhaul garbage should be double bagged in plastic garbage bags to prevent leaks inside the aircraft. Garbage may be hauled externally in cargo lift bags or in a net with protective covers such as a burlap sack.
- Cargo should be secured by restraining straps or nets constructed of synthetic webbing; straps or nets should be attached to cargo rings or attachments points specifically designed for restraining purposes.
- Hazardous materials should be marked and the Pilot aware of the items being transported. Transportation of these materials must comply with the Interagency Aviation Transport of Hazardous Materials Guide or Handbook or 49 CFR Parts 171-175.
- Avoid transporting liquid hazardous materials, such as gasoline, with food or personal gear.
- Consider putting personal gear and packs in plastic bags if transporting with other non-hazardous liquid containers and tape the neck of the plastic bags to prevent the plastic from ripping in transit.
- Ensure that sharp tool edges are covered by tool guards or tape to protect the cargo net or other container.
If multiple loads are to be transported, tag each load with its weight and destination.
If using the carousel hook system (see Chapter 9), make sure the Pilot is aware of the destination sequence.

X. Establishing the Loading Area.

Chapter 8 provides some general guidance on establishing loading areas. Refer to Chapter 15 for more detailed information.

XI. Loading and Rigging Procedures.

A. Internal Cargo.

- All internal cargo shall be properly stored and secured, regardless of whether passengers are being transported with the cargo.
- All packs must be secured if carried in the passenger compartment. Packs shall not be carried unsecured in a passenger’s lap or on the floor. Packs can be stored separately in the cargo compartment, in external cargo racks or transported in an external sling.
- Do not exceed the weight limit of the cargo compartment or racks. This weight should be placarded within or outside the compartment, usually on the door. If in doubt, ask the Pilot.

B. External Cargo Racks.

- Do not exceed the weight limit for a cargo rack or basket. This weight should be placarded on the rack. With certain makes and models of helicopters with racks on either side, the weight limitation for one may differ from that on the opposite side.
- Cargo should be loaded within the center of gravity (CG) of the aircraft as computed by the Pilot.
- Inspect tie-down devices for rips, tears or cracks.
- When securing cargo in the racks, start at the front of the rack and lace the tie-down strap or bungee cord through pack straps or handles on containers or equipment toward the rear. This will eliminate the possibility of items coming loose from the rack and potentially interfering with the tail or main rotor.

C. Proper Rigging Methods for External Cargo.

- The importance of inspecting equipment prior to rigging cannot be over-emphasized. Chapter 9 contains information on both commonly used and specialized external load equipment.
• Ground personnel and Pilots should be thoroughly trained and briefed on rigging and hand signals.

• Personnel should never stand under a load, or between the load and an immovable object, when working around operating helicopters.

• When working with unstable loads, personnel should avoid placing hands in an area where they can be caught in rigging.

• EVERY load gets a swivel to avoid line twisting. When building loads using multiple nets, a swivel should be in place for each net.

• With loads comprised of multiple nets, the fragile or lighter loads may be rigged above or below the heavier loads. Consult the Pilot regarding rigging preferences.

• It is acceptable to use a longline without a remote hook, provided that qualified personnel are available at both ends of the operation and that the cargo is attached at the bottom of the longline using a swivel.

• Some specialized loads, such as helitorches or buckets, may be flown without swivels.

• Fiber taping or securely strapping rigid water tanks into the closed position will prevent them from opening in flight.

• A single-point sling (choker strap) is not normally the best method to carry a load, except for items such as logs.

• A two-point sling with less than a 45 degree angle to the hook or longline is the common method for most loads that will not fit into a cargo net. See Exhibit 11-2.

• Use a four-point sling for box-like loads. See Exhibit 11-2.

• A spreader bar is useful for stabilizing a load, or where the sling may catch or damage the load if attached conventionally. See Exhibit 11-2.

• Properly rolled and secured, empty cargo nets may be flown on the cargo hook, leadline, or a longline. The forward motion of the helicopter may cause the net to trail and drift up towards the tail, with potential to become caught in the tail rotor. Leadlines with empty cargo nets should be shorter or much longer than the distance between the cargo hook and the tail rotor.

• Certain loads such as vehicles, crashed aircraft, and other irregular loads, require special rigging including the use of drogue chutes or spoilers. Never attempt to build such loads without prior training and/or experience.

• The aerodynamic configuration of a load may cause it to spin and oscillate, which in turn may cause the Pilot to experience control problems with the helicopter. Such difficulties may cause the Pilot to return with the load for re-rigging, or, in extreme cases, to release the load, either intentionally or inadvertently.
There is no way to predict how each load will fly. This is especially true of non-standard loads such as large water guzzlers, cement mixers or pipe. Consult with the helicopter vendor or Pilot, who may be able to supply the necessary expertise and/or equipment.

If a load does not fly well, rig the next load differently and try again, provided there are no safety issues. If safety will be compromised, other means of transportation should be found, such as ground vehicle, pack train or paracargo.

REMEMBER: The Pilot always has the final say regarding whether or not to conduct the mission. Do not pressure the Pilot, either implicitly or explicitly, into flying a load with which he or she does not feel comfortable.

Exhibit 11-2: Single-, Two-, and Four-Point Loads
1. **Cargo Net.**

Some considerations when working with cargo nets:

- Center the weight and make the load as symmetrical as possible. Place heavy items in the center of the net first, with light items on top.
- Do not weave purse strings through the net. The net will not cinch properly and will be exposed to excessive wear.
- Pull tension on the purse string(s). If the net has two encircling lines, both should be made even in length before attaching the leadline or swivel.
- After the net is secured, look for holes or openings where items could slip through.
- If a leadline is necessary, attach a swivel between the leadline and the cargo hook. See Exhibit 11-13.
- A swiveling cargo hook may be used in place of a separate swivel on some missions such as bale bombing.
- The recommended way of carrying multiple nets on one longline is to have one attached to the cargo hook by a leadline (and swivel!) so that it rides below the other. See Exhibit 11-13.
- Tag each load with destination and total weight of load, including net, swivel and other accessories.

**CAUTION:** Use of a net with a tarpaulin spread inside is prohibited due to the potential for the tarpaulin or other covering to slip out and become entangled in the rotor systems or airframe.

2. **Cargo Hook/Ring Interface.**

The connection between the cargo hook and the swivel or leadline ring is a critical interface. Loads can be inadvertently dropped, or can be non-releasable, due to incorrect connections. See Exhibit 11-3.

The size or shape of the ring is a significant factor in inadvertently released loads. Personnel should be aware of the following:

- When the ring maximum inside diameter is greater than the “snout” dimension on the cargo hook, there exists a small potential for the ring to ride over the load beam and inadvertently release from the cargo hook. See Exhibit 11-3.
- Ring shapes other than a circle (e.g., oval- or pear-shape) pose the greatest chance of inadvertent release. However, such release is rare for any rings when properly placed on cargo hooks.
• Use of a swivel reduces the chance of a hung load by limiting the torsional load that can be applied to the ring. Refer to Exhibit 11-4 for incorrect methods of hooking loads.

**Exhibit 11-3: Snout Dimension On a Cargo Hook**

3. **Box-Like Loads.**

Box-like loads usually fly very poorly, as they tend to spin. Use a “tail” (e.g., tree branch) as shown in the exhibit. Ensure the tail is well-secured to the bottom of the load. See Exhibit 11-4.

**CAUTION:** Use of drogue chutes is prohibited except by trained, experienced personnel. Drogue chutes will only be used on longline loads.

4. **Pipe.**

Pipe shackles or hooks allow a number of pipes to be carried. See Exhibit 11-5.

Use of chains as the connecting lines will work for loads of a weight that Type 3 helicopters can carry. They are easier to store than cables. However, for loads over 1,000 pounds, chains can bind where they cross and fail to tighten, allowing pipes to slip out. This is especially true if the load spins.

Cables are better, although they have to be replaced when they become kinked. Using a leader will require replacement of only a short length rather than the entire cable.
Exhibit 11-4: Rigging A Box-like load with a Tree Branch as a Tail

Tree Branch Used As Tail

Exhibit 11-5: Rigging Loads of Pipe

CAUTION: Ensure the shackles are hooked on opposite ends of the same pipe.
5. Barrels.

Barrels may be rigged by using a choker as depicted in Exhibit 11-6 or by using barrel hooks or clamps designed specifically for that purpose.

Use the method shown below if barrel hooks are not available or are not preferred. Barrel hooks are made of chain or cable. Two sets are usually used together. A bungee cord with a clip on one end allows the hooks to be dropped off the barrels on touchdown at an unattended landing site.

**Exhibit 11-6: Rigging Barrels Without Barrel Hooks**
6. Plywood or Lumber.

Plywood and lumber are one of the hardest loads to transport because the load’s wing-like shape often causes the load to fly, unfortunately often in a direction independent of the helicopter’s intended flight. See Exhibit 11-7.

CAUTION: Use an end stop to prevent pieces on the interior of the load from slipping out. Ensure the material is well-secured to the stack itself.

Exhibit 11-7: Rigging Plywood or Lumber Slings
7. Wire Spools.

The material shown in the illustration below must be fastened securely to the bottom of the spool, while allowing room through which to loop the choker. It should be dimensionally strong enough to bear the weight of the spool when tension is applied. See Exhibit 11-8.

Exhibit 11-8: Rigging Wire Spools
8. **Poles and Logs.**

Logging operations use a cable choker where a ball on the end clips into a sliding catch further up the cable. The cable then “choke”s down on the log when it is under tension. If this equipment is available, use it. See Exhibits 11-9 and 11-10.

**Exhibit 11-9: Rigging a Single Pole or Log For Flight**

CAUTION: Use of a single choker vertically in a straight line (that is, without one end being looped through the other end), or in a “basket,” U-shaped configuration, is not approved.

For pole setting, a clove hitch can be used (two half-hitches back to back) at the bottom of the pole. Run the rope up to the top and make a half-hitch.

When the load is placed on the ground, the sling will loosen and can be easily removed by ground crew. A remote hook can be useful for releasing chokers, or when you want to retain the lead or longline.

To keep the load from slipping out, wrap the rope or chain twice around the end of the pole when carrying a single pole or log, as shown in the illustration in the exhibit above.
Exhibit 11-10: Rigging Multiple Poles or Logs for Flight

**NOTE:** Multiple poles or logs can be wrapped with heavy wire. Attach the wire to each log with fencing staple and use a choker 1/3 of the way from the end of the logs.

**CAUTION:** With multiple-log loads, use an end stop to prevent interior logs from slipping out. Ensure the material used is well secured to the stack itself.

XII. Hookup Methods.

There are four methods of hooking up loads to the helicopter for transport. These are:

- Hookup while the aircraft is on the ground.
- Hover hookup attaching the rigged load directly to the cargo hook (no leadline).
- Hover hookup using a leadline.
- Hover hookup using a longline with a remote electric hook or carousel.
A. **Preparation for the Hookup.**

Basic tasks that should be performed prior to performing any external load operation include the following.

- Prepare by removing any items from the helicopter that are not essential.
- If requested, assist the Pilot with the removal of all or any doors and store in a safe location at the Pilot’s direction.
- Check both the rigging of the load and the external load equipment according to the requirements and guidelines discussed in Chapter 9.
- Attach the load to a swivel. Use of a swivel is required in most cases. Attach the swivel to the cargo hook or leadline. If using a longline with remote hook, attach the swivel to the remote hook.

B. **Hookup with Helicopter on the Ground.**

This method is usually used when the helicopter is shut down, and involves the least amount of risk to those involved.

The Pilot should be present when hooking the load to the aircraft. Once the load is ready, perform a two-point hook check.

- Pilot checks manual release to the cargo hook.
- Pilot checks the electrical release to the cargo hook.
- Check the electrical function of the mission equipment (for example, water bucket release, remote electric hook release, helitorch pump, etc.).
- Run the leadline from the load swivel to the cargo hook, ensuring that the line is not near or looped over any skid.

It is important to test the manual release first before the electrical release. This sequence is necessary because the manual release is usually a cable susceptible to snagging or incorrect rigging.

Some operators want to test the manual release only once per day as more checks may put undue wear on the release. If this is the case, those manual releases may be checked one time per day.

After all checks have been performed, visually inspect the cargo hook to ensure the release arm or knob is fully reset.
C. **Hover Hookup with No Leadline.**

This method involves attaching the load directly to the cargo hook.

The method has disadvantages. There may not be enough slack in the net’s perimeter lines to allow the hookup person to attach the load on the cargo hook easily. In extreme cases, the helicopter may have to descend almost on top of the load itself.

D. **Hover Hookup with Leadline.** See Exhibit 11-12.

Hover hookups with leadline are effective:

- When multiple loads need to be transported in a short time frame.
- When the load destination involves terrain on which the helicopter is unable to land.
To determine when and how to use a leadline, consider:

- Pilot preference on length of leadline.
- Cargo to be transported.
- Terrain and surrounding vegetation at the destination or takeoff point.

Additional leadline lengths may be necessary for bulky loads, when doing special projects, or when the hookup person underneath the helicopter may need additional length to perform the hook-up. If the pilot is not carded for vertical reference, the bottom of the load should not be more than 50’ below the cargo hook.

**Exhibit 11-12: Performing a Hover Hookup with Leadline**
E. Hover Hookup with Longline and Remote Electric Hook.

Hover hookups with longline and remote electric hook are effective:

- When multiple loads need to be transported within short time frames.
- When the load is on terrain on which the helicopter is unable to land or take off.
- When the surrounding vegetation and/or terrain is such that the helicopter is unable to perform a hover hookup with a standard length of leadline.
- When ground personnel are not at the receiving site.
- Use of a longline with remote electric hook carousel allows the Pilot to place loads at different locations during the same mission.

Exhibit 11-13: Daisy Chain Configuration
XIII. General Requirements for External Load Missions.

A. Required Personnel.

1. Hookup with helicopter on the ground. Only one person is necessary for this type of operation, since the Parking Tender can accomplish the hookup, then exit and perform marshalling duties.

2. Hover hookup. Only trained and qualified personnel shall perform hover hookup operations. It is recommended that two individuals perform the operation, a Parking Tender and a hookup person.

3. Longline with remote electric hook. Two people are recommended, a Parking Tender and a hookup person. If circumstances dictate, one person may perform the operation, provided there is positive air-to-ground radio communication between the Pilot and the individual performing the hookup.

B. Radio Communications.

For operations where radio communication is recommended or required, a secure or discrete operating frequency should be established, radios checked during the briefing, and ground contacts identified. Pilot shall receive radio communications from only one person.

1. Hover hookup with or without leadline. For hover hookup operations with or without leadline, it is recommended that the Parking Tender be equipped with a radio. Use of the flight helmet adapter to a handheld radio is optimal, though a headset worn beneath a hard hat, with adapter to a handheld, will work.

2. Hover Hookup with Longline and Remote Electric Hook. Radio communications between the Pilot and Parking Tender or hookup person is required.

C. Briefings.

A pre-mission safety briefing must be conducted with the Pilot, Parking Tender, and hookup person. Hand signals and emergency procedures are an integral part of this briefing.


Although there are rare instances where terrain dictates the need for two individuals to give hand signals, the Pilot should normally receive hand signals from one person. Ensure that the ground crew and Pilot are thoroughly familiar with standard signals. For hover hookups, these should include:

- The helicopter’s height above the hookup person (accomplished by using the Move Downward signal).
- Indication that the helicopter should hold while the hookup person leaves the area (Hold Hover signal).
- Indication of load clearance (accomplished by using the Move Upward signal).
- Clear to take off (Clear to Take Off signal).

**Exhibit 11-14: Standard Helicopter Hand Signals**

**HELIKOPTER HAND SIGNALS**

- **CLEAR TO START ENGINE**: make a circular motion above head with right arm.
- **HOLD ON GROUND**: extend arms out at 45 degrees, thumbs pointing down.
- **MOVE UPWARD**: arms extended, swooping up.
- **MOVE DOWNWARD**: arms extended, sweeping down.
- **HOLD HOVER**: arms extended with clenched fists.
- **CLEAR TO TAKE-OFF**: extend both arms above head in direction of take-off.
- **LAND HERE, MY BACK IS INTO THE WIND**: extend arms toward landing area with wind at your back.
- **MOVE FORWARD**: extend arms forward and wave helicopter toward you.
- **MOVE REARWARD**: arms extended downward using shoving motion.
- **MOVE LEFT**: left arm horizontal, right arm sweeps over head.
- **MOVE RIGHT**: left arm horizontal, right arm sweeps over head.
- **MOVE TAIL ROTOR**: rotate body with one arm extended.
- **SHUT OFF ENGINE**: cross neck with right hand, palm down.
- **FIXED TANK DOORS**: open arms outward, close arms inward.
- **RELEASE SLING LOAD**: contact left forearm with right hand.
- **WAVE OFF DO NOT LAND**: wave arms from horizontal to crossed overhead.
2. **Emergency Procedures.** Prior to hover hookup operations, emergency procedures must be established between the Pilot and ground crew. The emergency briefing is usually presented by the Pilot and addresses procedures in the event of a mechanical failure.

- The Pilot should indicate that the intent will be to move the helicopter away from the hookup person underneath the aircraft. Generally, this will be to the Pilot’s side of the helicopter, but confirm this with each Pilot.
- The hookup person should move in the opposite direction from that of the helicopter, or fall flat next to the load and attempt to gain as much protection as possible.

**D. External Load Operations.**

1. The performance of external load missions must be contingent upon proper assessment and preparation of the delivery site by first mitigating hazards.
2. The selection of dip/snorkel sites may require concurrence of agency personnel such as resource advisors. While it may not be feasible to approve every dipsite, check first.
3. In areas of sloping terrain or with obstacles rising to one or more sides of the cargo pickup/delivery area or dipsite, the pilot shall maintain rotor clearance from all obstacles equivalent to the Chart 8-1 landing area safety circle requirements.
4. When obstacles present a risk of contact with aircraft or rotor blades, the pilot should decline the mission until hazards are removed, additional line can be added, or a better location can be identified. Pilots have the final say in accepting or declining any mission.
5. If the helicopter is within ½ rotor diameter of the highest obstacle, the pilot should consider adding another length of line.

**E. Personal Protective Equipment.**

See Chapter 9, Chart 9-2.

**F. Equipment.**

Check equipment according to procedures in Chapter 9. Check serviceability or general condition of equipment. Check the load-carrying capacities of nets, leadlines, swivels, etc.

**G. Grounding.**

Static electricity may present a problem to the hookup person when attaching loads to hovering helicopters. Allowing the remote hook to touch the ground, use of rubber gloves, grounding the load to the helicopter skid prior to attaching to the cargo hook (never touch the skids or any other part of the helicopter without the Pilot’s permission), Pilot keying the radio prior to the hookup person attaching the load, etc, are ways to reduce static shock.
Unfortunately, there is no method that ensures that the hookup person will not receive some amount of electrical shock when the swivel touches the hook.

XIV. Procedures for Hover Hookups.

A. General.

These are standard procedures for any hover hookup, regardless of whether a leadline or longline is used.

- The load should be placed in front of the helicopter skids, with no potential for lines to become snagged over the skids.
- The cargo net’s perimeter lines should be drawn over the top of the load and laid so that the lines and leadline are prevented from becoming entangled in the net during liftoff.
- The Parking Tender should direct the Pilot by radio or standard hand signals. Placement of loads carried by longline and remote electric hook may be done independently by the Pilot if no ground personnel are available.
- The Parking Tender should be far enough back of the load to remain visible to the Pilot at all times.
- The Parking Tender should be slightly to the side of the load so that they can maintain visual contact with the Pilot. For helicopters that are flown from the right seat, the Parking Tender should be approximately at the Pilot’s “2 o’clock” position.
- The Parking Tender should wear a non-flammable, high-visibility vest to distinguish him or her from other personnel on the deck.
- Measures to prevent static electrical shock may be taken by the hookup person and the Pilot, once agreed upon.
- After the hookup is completed, the hookup person should exit from underneath the helicopter to the front and in full view of the Pilot and proceed to a position that is not in the departure path of the helicopter. Always keep the load between you and the helicopter.

CAUTION: When exiting, the hookup person should take care not to become entangled in either the line or the load. WALK, DO NOT RUN.

- When the hookup person is clear, the Parking Tender may signal the Pilot to begin moving the load. The Parking Tender must pay close attention as the helicopter lifts and tension is applied to the line. An improperly rigged or placed load can become snagged at any time. If the load becomes snagged or is improperly rigged or hooked, the Parking Tender must communicate this to the Pilot using the radio or hand signals.
- The hookup person should remain ready to take direction from the Parking Tender
should the load or line become snagged.

**CAUTION:** The hookup person should never re-enter the load area beneath the hovering helicopter unless the Parking Tender directs the hookup person to do so, and the pilot is aware of the person’s movement.

The hookup person should never attempt to re-rig a load when tension is still applied to the load by the helicopter. Hands, arms, or other parts of the body could become snagged in the load, causing serious injury.

Water buckets and longlines should be attached to the helicopter while it is on the ground and **NOT** hover hooked/plugged.

Hover hookups to connect electrical power accessories should not be performed. If an electrical connection is loose or not functioning, the pilot should land and rectify the problem.

**B. Longline and Longline with Remote Electric Hook Procedures.**

Considerations and requirements for longline with remote electric hook operations include:

- The sling load should be placed on the ground in the center of the loading area.
- On approach, the signal person should advise the Pilot on load clearance from trees, load height above the ground, and any problems that might arise in the pickup or drop zones.
- For safety purposes, the hook should be placed next to the load. The hookup person should not be next to the load at the time the Pilot is placing the hook.
- Once the hook is placed on the ground, the Pilot should then move the helicopter to the side so the hookup person is not directly beneath the hovering helicopter.
- When attaching a load to the remote electric hook, the hookup person should allow the hook to contact the ground before touching it. This grounds the hook and eliminates the possibility of shock from static electricity.
- When attaching a load to a remote hook, take the remote hook to the swivel rather than taking the swivel to the remote hook. This ensures positive control of the hook.
- The hookup person hooks the load to the remote electric hook and leaves the area. On approach or departure to the remote hook, the hook-up person shall not step over the longline when attaching the load.
- Helicopter is then positioned above the load and the load is lifted from the ground and flown out.
- When receiving a load, stay clear of the landing area. Let the Pilot set the load on the ground and release it before entering the area. On approach or departure the hookup person shall not step over the longline when detaching the load.
XV. Cargo Letdown

Cargo letdown is a system that allows the controlled descent of lighter cargo loads (water containers, chain saws, backpack pumps, etc.) from a hovering helicopter into areas that preclude landing. See Exhibit 11-15.

For equipment and training requirements and procedures, refer to the *Interagency Helicopter Rappel Guide*.

**Exhibit 11-15: Cargo Letdown Option**
XVI. Cargo Freefall.

The freefall of cargo from a helicopter is another method of delivering cargo to an area where conventional delivery methods will not work.

Rations and other durable items, as well as more fragile items, can be dropped by freefall when properly packaged. Larger loads can be delivered by releasing the cargo net from the cargo hook at a minimum safe altitude and air speed. Drops must be made a safe distance from personnel on the ground.

A. Required Personnel.

All Helicopters. Minimum aircrew will consist of pilot and spotter (spotter will conduct dropping operations). The spotter should be a qualified Helicopter Manager for freefall cargo operations. Some missions may require additional personnel.

B. Criteria For and Situations When Cargo Freefall May Be Used.

Freefall of cargo should only be done after the following criteria have been met and in the following situations:

- The helicopter cannot land safely and the mission has been determined to be tactically essential.
- Other methods of cargo transportation have been considered and cargo freefall has been determined to be the most efficient and economical method.
- A helicopter load calculation has been completed using the helicopter hovering out of ground effect chart. Consideration must be given to weight of cargo and maintaining center of gravity limits.
- There is adequate clearance from obstructions in the flight path and at the drop zone.
- All personnel involved have been thoroughly briefed. This will include the Pilot, spotter, dropper, and all ground personnel.
- Positive air-to-ground communications are established.

C. Planning for the Drop.

The operation is conducted in two phases. Planning prior to the drop is the first phase.

1. Compliance with Aircraft Flight Manual. All procedures will comply with the aircraft manual (for example, door removal).
2. Line of Authority. The Pilot and spotter must know the contact at the drop zone. The person at the drop zone must be aware of the mission and have established a drop zone.
3. Selection and Packing of Cargo. Packing will depend largely on what materials are available. Cargo must be selected and packed to prevent undue damage.
   a. Little or no packing required. Items that require little or no packing include:
      - Fire hose and sleeping bags. These must be banded with rubber bands, straps, or filament tape. Ends of the hose should be coupled to prevent damage.
      - Hand tools. These should be taped together with heads protected and appropriately packaged (for example, padded with several layers of cardboard).
      - Rations.
   b. Packing of fragile or items. Without access to large quantities of packing material, the only fragile items that are practical to drop are water, batteries, and other inexpensive items. Fragile items will have to be appropriately packaged to prevent damage. It is suggested that bases intending to use cargo freefall stock packing material and boxes both at the base and in the helicopter chase truck.

4. Equipment Required. An approved restraint harness fastened to a hard point must be worn by any individual (spotter and/or dropper) who will not be normally restrained by a seatbelt. The tether must be adjusted so that the individual cannot break the plane of the doorway.

5. Selecting the Drop Site. When selecting the drop site, consider the items you are delivering and at what height you will have to release them. Site selection is not as critical for items such as tools or sleeping bags which can withstand more impact. Fragile and breakable items such as radios and power saws require special consideration. Look for areas where a lower drop can be accomplished. If available, a patch of brush serves as a good cushion.
D. Drop Procedure.

The following procedures must be followed.

1. Air-to-ground communications shall be established before drop zone is selected.
2. The drop zone shall be identified on the ground (marker, ribbon, flagging).
3. Two reconnaissance runs, one high-level and one low-level, shall be made over the drop zone.
4. A high-level reconnaissance of the drop zone shall be made to determine:
   - If the drop is feasible at the selected site.
   - That ground personnel have moved a safe distance out of the drop zone.
   - Wind conditions, including direction and speed.
   - Location and nature of ground and aerial hazards.
5. A low-level reconnaissance of the drop zone shall be made. At this time, the Pilot and dropper shall:
   - Reconfirm hazards in the drop zone
   - Determine approach and departure routes.
   - Check for personnel too near the drop zone and/or approach-departure path.
   - Confirm with the ground contact that the area is clear.
   - Make final check of cargo to be delivered.
   - Both agree to proceed.
6. On the drop pass, the cargo will be delivered if there are no changes in conditions.
   - Remember to anticipate the forward speed of the helicopter.
   - Drop cargo laterally out and away from the helicopter and not toward the tail rotor or skids.

CAUTION: Do not hesitate to suspend dropping operations when conditions are marginal or unsafe.