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This advisory circular (AC) provides background information, describes rotorcraft external-load operations, and describes an acceptable means, but not the only means, to apply for and obtain authorization to conduct rotorcraft external-load operations under Title 14 of the Code of Federal Regulations (14 CFR) part 133. Federal Aviation Administration (FAA) personnel will provide the necessary materials and information during the application process. This AC also provides guidance and information for certificated rotorcraft external-load operators. The information in this AC and related reading material will assist you in completing the application process in an efficient and accurate manner.

A handwritten signature in black ink, appearing to read "John S. Duncan".

John S. Duncan
Director, Flight Standards Service



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CHAPTER 1. GENERAL

- 1.1 Purpose of This Advisory Circular (AC).** This AC provides background information, describes rotorcraft external-load operations, and describes an acceptable means, but not the only means, to apply for and obtain authorization to conduct rotorcraft external-load operations under Title 14 of the Code of Federal Regulations (14 CFR) part 133. Federal Aviation Administration (FAA) personnel will provide the necessary materials and information during the application process. This AC also provides guidance and information for certificated rotorcraft external-load operators. The information in this AC and related reading material will assist you in completing the application process in an efficient and accurate manner. To be eligible for a Rotorcraft External-Load Operating Certificate, an operator must meet the following eligibility requirements:
1. The applicant must have the exclusive use of at least one rotorcraft that meets the requirements of part 133, § 133.19.
 2. The applicant must hold, or have available the services of at least one person who holds, a current commercial or Airline Transport Pilot Certificate (ATPC) with a rating appropriate for the rotorcraft prescribed in § 133.19, issued by the Administrator.
- 1.2 Audience.** This AC applies to all operators seeking a part 133 Operating Certificate and all operators that currently have a part 133 Operating Certificate.
- 1.3 Where You Can Find This AC.** You can find this AC on the FAA's website at http://www.faa.gov/regulations_policies/advisory_circulars.
- 1.4 What This AC Cancels.** AC 133-1A, Rotorcraft External-Load Operations in Accordance with Federal Aviation Regulations Part 133, dated October 16, 1979, is cancelled.
- 1.5 Applicability.** This AC provides information for persons interested in applying for a Rotorcraft External-Load Operating Certificate.
1. A 14 CFR part 137 agricultural aircraft operator may, if he or she complies with part 137, conduct agricultural aircraft operations with a rotorcraft with external dispensing equipment in place without a part 133 Rotorcraft External-Load Operating Certificate.
 2. The holder of a Rotorcraft External-Load Operating Certificate under part 133 need not comply with part 137 subpart B certification rules when conducting an agricultural aircraft operation involving only the dispensing of water on forest fires by rotorcraft external-load means. However, part 137 subparts A, C, and D apply.
- 1.6 Related Regulations.** Title 14 CFR parts 1, 21, 27, 29, 61, 91, and 133 and 49 CFR parts 100–175 (hazardous materials (hazmat)). The current CFRs can be accessed at <https://www.ecfr.gov>.

1.7 Related Reading Material (current editions). The following websites and references provide additional information related to this AC:

1. FAA ACs. The following are available at http://www.faa.gov/regulations_policies/advisory_circulars/:
 - AC 27-1, Certification of Normal Category Rotorcraft.
 - AC 91-32, Safety In and Around Helicopters.
 - AC 91-42, Hazards of Rotating Propeller and Helicopter Rotor Blades.
 - AC 120-92, Safety Management Systems for Aviation Service Providers.
2. FAA Handbooks and Manuals.
 - FAA-H-8083-21, Rotorcraft Flying Handbook, available at http://www.faa.gov/regulations_policies/handbooks_manuals/.
 - Safety Risk Management, available at https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/risk_management/.
3. FAA Orders and Notices. Available at http://www.faa.gov/regulations_policies/orders_notices/.
4. Other Materials.
 - International Helicopter Safety Team (IHST) Safety Management System Toolkit at http://www.ihst.org/Portals/54/2009_SMS_Toolkit_ed2_Final.pdf.
 - Utilities, Patrol and Construction (UPAC) Safety Guide for Helicopter Operators at http://www.rotor.org/portals/1/committee/upac_guide.pdf.

1.8 Definitions. The following paragraphs define rotorcraft external-load combinations and designations, and describe Operating Certificate requirements. Rotorcraft-load combinations (RLC) are defined as follows:

1. Class A Rotorcraft-Load Combination (RLC). The external load cannot move freely, cannot be jettisoned, and does not extend below the landing gear. An example of a Class A load is the carriage of items in an approved cargo rack, bin, or fixture attached to the exterior of the aircraft. A cargo rack certification may or may not include a cargo envelope. The FAA-approved Rotorcraft Flight Manual Supplement (RFMS) required for the cargo rack installation specifies the approved configuration. If the cargo carried is within the envelope specified in the RFMS, the rotorcraft operator may operate in accordance with 14 CFR part 91 or 135. Rotorcraft operators must conduct flight operations in accordance with part 133 when the cargo rack certification does not include a cargo envelope or the cargo carried exceeds the specified envelope.

2. Class B RLC. The external load is jettisonable, carried above or below the skids, and lifted free of land or water during the rotorcraft operation. An air conditioner unit being lifted onto the roof of a tall building is an example of a Class B load.
3. Class C RLC. The external load is jettisonable and remains in contact with land or water during the rotorcraft operation. Wire stringing, dragging a long pole, and boat towing are some examples of Class C loads.
4. Class D RLC. The external load is other than Class A, B, or C and approved on an individual basis through the issuance of Letter of Authorization (LOA) A044, Class D Operations Involving Carriage of Persons, using the Web-based Operations Safety System (WebOPSS). Only approved Class D operations allow carriage of a person other than a crewmember or person who is essential and directly connected with the external-load operation, in an FAA-approved personnel lifting device with a transport Category A multiengine helicopter. A harbor pilot being transported externally to or from a ship utilizing a personnel lifting device or a person being rescued utilizing a personnel lifting device are examples of Class D loads. Any other carriage of persons under part 133 must be in accordance with § 133.35.
5. External Load. A load that is carried, or extends, outside the aircraft fuselage.
6. Human External Cargo (HEC). A person(s) that at some point in the operation is carried external to the rotorcraft.
7. Non-Human External Cargo (NHEC). Any external cargo operation that does not at any time involve a person(s) carried external to the rotorcraft.

1.9 Background. Rotorcraft external-load operations in the United States have steadily increased over the past two decades. The FAA’s General Aviation and Part 135 Activity Survey estimated that, in 2015, operators flew 175,000 hours under part 133. Since publication of AC 133-1A in 1979, several amendments have been made to part 133. While some changes were administrative in nature, others affected the operating, airworthiness, and certification rules for external-load operators.

1.9.1 Amendment 133-9. In November 1986, as part of its Rotorcraft Regulatory Review Program, the FAA published Amendment 133-9. This amendment:

- Defined “Class D rotorcraft-load combinations” in part 1 and prescribed the operational rules for Class D loads;
- Changed the applicability of the certification requirements for certain types of operations;
- Updated personnel requirements;
- Amended knowledge and skill requirements;
- Simplified Operating Certificate amendment procedures;
- Defined requirements for flight under instrument flight rules (IFR);

- Amended flight characteristics demonstration requirements; and
- Simplified the process for adding rotorcraft to an Operating Certificate.

1.9.2 Amendment 133-12. In March 1990, also as part of the Rotorcraft Regulatory Review Program, the FAA published Amendment 133-12. This amendment adopted new airworthiness standards for external-load attaching means as defined by parts 27 and 29. The operational rules were also revised to allow use of external-load attaching means and quick-release devices approved under part 21, as long as they comply with the applicable provisions of part 27 or 29.

1.10 AC Feedback Form. For your convenience, the AC Feedback Form is the last page of this AC. Note any deficiencies found, clarifications needed, or suggested improvements regarding the contents of this AC on the Feedback Form.

CHAPTER 2. CERTIFICATION PROCESS AND RULES

2.1 Application Process. The application process is designed to ensure that you, the operator, meet the requirements for certification under 14 CFR part 133. If satisfactorily completed, the application process will result in issuance of a Rotorcraft External-Load Operating Certificate and any additional authorizations.

2.1.1 Certification Process Phases. There are five phases in the application process (see Figure 2-4, Certification Process Flowchart):

1. Preapplication (combined with Formal Application Phase in most instances),
2. Formal Application,
3. Document Compliance,
4. Demonstration and Inspection, and
5. Certification.

Note: The part 133 certification process combines Phase 1, Preapplication, and Phase 2, Application.

2.1.2 Certification Process Gates. Included in the five phases are three gates. The three gates are points in the process at which requirements must be met before proceeding to the next part of the application process.

Note: Certain cases may dictate that the guidance and suggested sequence of events in this AC be modified. In such situations, the applicant and the local Flight Standards District Office (FSDO) should consider existing conditions and circumstances. The FAA will not issue an Operating Certificate until it determines that all requested authorizations can be conducted in a safe manner and all applicable FAA regulations, guidance, and policy have been complied with.

2.2 Phase 1 and Phase 2—Preapplication and Application.

2.2.1 Applicant Resources.

1. To start a part 133 application, contact the local FSDO for your primary business address. The FSDO will provide the applicant with the appropriate information and references needed to begin the certification process. The applicant should be aware of the certification and operating requirements of part 133. The FSDO personnel will explain:
 - The general applicability and definition of terms.
 - The certification requirements.
 - The operating rules.

- Part 133 recordkeeping requirements.
 - The requirement to comply with other Federal, State, and local regulations.
2. Special considerations include:
- Load class authorizations A, B, C, or D.
 - Instrument flight rules (IFR) authorization requirements.
 - Qualifications and experience required for the Chief Pilot.
 - Rotorcraft-Load Combination Flight Manual (RLCFM) requirements.
 - Training program requirements for Class D operations.
 - Hazardous materials (hazmat) training program, if applicable.

2.2.2 FAA Form 8400-6, Preapplication Statement of Intent. Complete the Preapplication Statement of Intent (PASI) (available at <http://www.faa.gov/forms>) and submit it to the FSDO (see Figure 2-1, FAA Form 8400-6, Preapplication Statement of Intent). Upon receipt of a signed PASI, the FSDO will review the form to ensure that there is sufficient information to further process the preapplication and that the proposed operation is consistent with part 133. The PASI must contain the following:

- The company legal name, including any doing business as (DBA) names, the principal base of operations address, the mailing address, phone numbers, and the planned date when operations will begin.
- Names of management personnel and the Chief Pilot.
- Type, make, model, and quantity of rotorcraft operated.
- All desired authorizations (e.g., Class A, B, C, or D or IFR) in block 10.

Note: If the PASI is unacceptable, the FSDO will describe the reasons why it is unacceptable in section 2 of the form and return it. The FSDO will notify the applicant, either verbally or by letter, that the PASI is unacceptable for the reasons detailed in section 2 of the form and that a new PASI is required.

2.2.3 Application Package.

1. FSDO personnel will provide the applicant with the following materials or refer you to the current online resource:
 - FAA Form 8710-4, Rotorcraft External-Load Operator Certificate Application (see Figure 2-2, Sample FAA Form 8710-4, Rotorcraft External-Load Operator Certificate Application).
 - Sample Letter of Nomination for Designation as a Chief Pilot (see Figure 2-3).
 - Sample Rotorcraft-Load Combination Flight Manual (see Appendix A).
2. FSDO personnel will discuss how to complete the forms and advise the applicant to submit the forms with original signatures.

3. The following factors will be used to determine if additional items need to be discussed with the applicant:
 - Previous experience in part 133 external-load operations;
 - Size, scope, and safety aspects of the requested operation;
 - Area of operation;
 - Class D or IFR authorization, if requested; and
 - Ability to comply with the certification requirements.
4. FSDO personnel will discuss the following with the applicant and answer any questions about the certification process:
 - The time and gate requirements for the completion of each phase;
 - Area of operation (local or across FSDO boundaries), including the location of the principal base of operations, and the location of any probable satellite bases;
 - Load class authorization(s) the operator is seeking;
 - Operator's previous experience with part 133 operations;
 - Qualifications and experience of the proposed Chief Pilot;
 - Applicability of 14 CFR parts 91 and 133;
 - AC 133-1, Rotorcraft External-Load Operations;
 - Previous or pending enforcement action against the applicant or pilot(s);
 - Contents of the RLCFM; and
 - Requirements for developing a training program for Class D operations.

2.2.4 Application Review. If the application package is not complete, the FSDO will notify the applicant in writing of the changes needed before certification can continue. An example of a properly completed application form is shown in Figure 2-2. An indepth review of the package will be conducted during the Document Compliance Phase.

2.2.5 Application Meeting. After the application review process is completed, an application meeting will be scheduled to discuss:

- A schedule for certification, and any necessary adjustments.
- The requirements for each load class authorization requested.
- The requirements for the RLCFM.
- The rotorcraft ownership or lease agreement.
- The applicant's previous experience in external-load operations.
- The experience and qualifications of the designated Chief Pilot.

- The requirements for an IFR authorization, if applicable.
- The requirements for a Class D training program, if applicable

2.2.6 Gate Complete. All steps in the Application Phase must be completed before continuing to the Document Compliance Phase (see Figure 2-4). If the applicant does not complete this phase within 90 days of the FSDO's receipt of the PASI, the FSDO may need to end the certification process. Completion of this gate triggers a new 90-day completion timeline for the Document Compliance Phase.

2.3 Phase 3—Document Compliance.

2.3.1 Application Form (FAA Form 8710-4).

1. In block 1, the applicant indicates the following:
 - “Original Issuance” if the application is for initial certification;
 - “Amendment” if the application is for a change to an existing certificate; or
 - “Renewal” if the application is for renewal of an existing certificate.
2. In block 1, the applicant enters the certificate number if the application is for amendment or renewal, and checks the appropriate block(s) to indicate the load classes requested.
3. In block 2, the applicant indicates the name (including DBAs), mailing address, and telephone number of the operator.
4. In block 3, the applicant indicates the address and telephone number of the principal or local base of operations. Verify the applicant has not used a post office box number in this block.
5. In block 4, the applicant indicates the name of the Chief Pilot or designee and that pilot's Airman Certificate grade (e.g., private, commercial, and airline transport pilot (ATP)) and certificate number.
6. In block 5, the applicant indicates all rotorcraft to be used by registration number, make, and model. The applicant also indicates the requested load classes and whether the attaching device for each rotorcraft has been previously approved by the FAA. The applicant may use the remarks column to indicate which rotorcraft will be used in IFR operations.
7. At the bottom of the form, the applicant or authorized officer must date and sign the application. The person signing the application must also include their title (e.g., Director of Operations or President).
8. The reverse side of the form is completed by the FAA during the Certification Phase.

2.3.2 Rotorcraft Lease. The rotorcraft lease must list:

- Name(s) of owner(s);
- Name of certificate holder/applicant;
- Identification and type of rotorcraft;
- Duration of lease (6 month minimum);
- Indication of sole possession, control, and use for flight, including an agreement for performance of required maintenance; and
- Signatures of the owners and certificate holder or applicant, to include dates.

2.3.3 RLCFM. See Appendix A for a sample RLCFM which includes a detailed description of the required content.

1. **Authority.** Part 133, § 133.47 requires the operator to develop an RLCFM as part of the application package for certification of rotorcraft external-load operations. Section 133.47(a) requires the RLCFM to include the operating limitations, procedures, performance, and other information established under §§ 133.41–133.51. This includes the information established during operational flight checks performed under § 133.41. The operator should place limitations, procedures, performance, and other information not included in the approved Rotorcraft Flight Manual (RFM) into the RLCFM.
2. **Content.** Section 133.47 outlines instructions and specifications for the contents of the RLCFM. Title 14 CFR part 27 subpart G or part 29, whichever is applicable, requires the establishment of operating limitations and other information necessary for safe operation. The RLCFM provides a means of conveying this information to the crewmembers.
3. **Purpose.** The RLCFM is a required document that provides the information necessary for the safe carriage of external loads.
4. **Developing an RLCFM.** The RLCFM must cover each class of external-load operation conducted with a specific rotorcraft. The operator must prepare an RLCFM for each rotorcraft, even if some makes and models are similar. The manufacturer's calculation of performance data and operating limitations may be unique for each rotorcraft. An operator planning to add or delete a load class must revise the RLCFM accordingly to reflect the safety considerations.
5. **Initiation.** The applicant for a part 133 external-load Operating Certificate must submit two copies of an RLCFM for review and approval, or one electronic copy, if acceptable, to the FSDO. The applicant must prepare the RLCFM in conformance with part 27 subpart G or part 29 subpart G.

2.3.4 Letter of Designation of Chief Pilot. Upon issuance and acceptance of the Letter of Designation, both the operator and Chief Pilot must sign the letter.

2.3.5 Qualifications of Chief Pilot. The Chief Pilot nominee must meet the requirements of § 133.21 and have passed the knowledge and skill test for external-load operations. The inspector may base the determination that the candidate's knowledge and skill are adequate on the Chief Pilot's previous experience and safety record in rotorcraft external-load operations. The Chief Pilot must have previously passed a knowledge and skill test for the same class of rotorcraft external-load operations.

Note: It may be necessary to administer a knowledge and skill test for the Chief Pilot; if so, it will be conducted during the Demonstration and Inspection Phase.

2.3.6 Rotorcraft and Equipment Maintenance Records. Airworthiness aviation safety inspectors (ASI) will inspect the following records:

- Rotorcraft maintenance records;
- Records showing FAA approval of the attaching means;
- Airworthiness and registration certificates;
- Approved RFM; and
- For Class D authorizations, records showing engineering approval of the personnel lifting device.

2.3.7 Class D Training Program (if applicable). A Class D initial and recurrent training program should contain the following elements.

1. Ground training for pilots should include:
 - a. Reviewing contents of the Class D authorization;
 - b. Calculating the longitudinal and lateral Weight and Balance (W&B);
 - c. Determining single-engine hovering out-of-ground effect performance, considering weight and environmental conditions (refer to § 133.45(e)(1));
 - d. Reviewing normal and emergency communications procedures, including hand signals;
 - e. Reviewing crew coordination procedures;
 - f. Reviewing preflight procedures for all equipment;
 - g. Reviewing congested area plan (CAP) requirements;
 - h. Briefing all persons involved with the external-load operation;
 - i. Using approved personnel lifting devices;
 - j. Operating the winch, including weight, longitudinal and lateral center of gravity (CG), operational limitations, preflight, normal, and emergency procedures;

Note: See Appendix C, Possibility of D-Ring Reversal or Dynamic Rollout During Winching or Long Line Operations, for information about winch operation.

- k. Reviewing night operation considerations, limitations, and risk mitigation procedures (if applicable);
 - l. Avoiding collisions and obstacles; and
 - m. Reviewing other information necessary to ensure pilot competence. For example, for each rotorcraft make and model used, examine the training program for information about the following:
 - Major rotorcraft systems,
 - Limitations of the rotorcraft make and model,
 - Performance characteristics,
 - Fuel consumption and management,
 - Approved RFM, approved RLCFM, and approved supplements,
 - Procedures for normal and emergency situations,
 - Explanations of the causes of loss of tail rotor effectiveness and procedures to recover, and
 - Avoidance of potentially hazardous meteorological conditions.
2. Flight training for pilots while carrying a simulated load (ballast) on the personnel lifting device should include:
 - a. Computing longitudinal and lateral W&B and performance planning;
 - b. Performing takeoffs and landings;
 - c. Maintaining directional control while hovering;
 - d. Accelerating from a hover;
 - e. Performing approaches to landing or work areas;
 - f. Operating the winch, if so equipped;
 - g. Using safety devices that prevent inadvertent release of the load;
 - h. Releasing the load in an emergency;
 - i. Single engine hovering and maneuvering for landing;
 - j. Night flight training (if applicable); and
 - k. Avoiding collisions and obstacles.
 3. Ground training for flightcrew members (e.g., winch operators) should include:
 - a. Reviewing normal and emergency communications procedures, including hand signals;
 - b. Operating the winch, including weight and operational limitations, preflight, normal, and emergency procedures;
 - c. The appropriate portions of the RLCFM;

- d. Reviewing crew coordination procedures;
 - e. Conducting a preflight inspection of lifting equipment;
 - f. Using the approved personnel lifting devices;
 - g. Using personal safety equipment, such as harnesses, clothing, and gloves;
 - h. Recognizing the onset of hazardous load oscillations;
 - i. Recognizing other dangerous situations;
 - j. Night operation considerations, limitations, and risk mitigation procedures (if applicable); and
 - k. Avoiding collisions and obstacles.
4. Flight training for flightcrew members (e.g., winch operators) while carrying a simulated load (ballast) should include:
- a. Operating the winch, if so equipped;
 - b. Communicating among crewmembers, including hand signals as well as normal and emergency communications procedures;
 - c. Using safety devices that prevent inadvertent release of the load;
 - d. Releasing the load in an emergency;
 - e. Using an approved personnel lifting device;
 - f. Using personal safety equipment, such as harnesses, clothing, and gloves;
 - g. Stabilizing oscillating winch loads;
 - h. Night flight training (if applicable); and
 - i. Avoiding collisions and obstacles.
5. Ground and flight training for ground crew personnel while carrying a simulated load (ballast) should include:
- a. Reviewing normal and emergency communications procedures, including hand signals;
 - b. Reviewing crew coordination procedures;
 - c. Performing a preflight inspection of the lifting equipment;
 - d. Using an approved personnel lifting device;
 - e. Operating the winch, including limitations and normal and emergency procedures;
 - f. The appropriate portions of the RLCFM;
 - g. Recognizing dangerous situations;
 - h. Recognizing the onset of hazardous oscillation of the load; and
 - i. Using personal safety equipment, such as helmets, gloves, and goggles.

2.3.8 Gate Complete. All steps in the Document Compliance Phase must be completed before continuing to the next phase (see Figure 2-4). The FSDO may end the certification process if the Document Compliance Phase has not been completed within 90 days. The completion of this gate triggers a new 90-day completion timeline for the Demonstration and Inspection Phase.

2.4 Phase 4—Demonstration and Inspection.

2.4.1 Knowledge and Skill Tests. A knowledge and skills test will be administered unless the Chief Pilot has previously passed the knowledge and skill test. The tests must have been for the same class of external load and for the same make and model of rotorcraft. Only in rare circumstances would the applicant's previous experience fully satisfy the requirements of § 133.23(d).

2.4.2 Knowledge Test. Whether the ASI selects either an oral or a written knowledge test, at least the following areas must be tested:

1. The pilot must be able to describe or answer questions about procedures for preflight inspection of aircraft, attaching means, and personnel lifting devices, if appropriate.
2. The pilot must be able to conduct an accurate survey of the flight areas to be used, including the pickup site, the route, and the landing site. The pilot should indicate that the routes for the approach to and departure from each site should be over the lowest obstacle and in the direction of the prevailing wind.
3. The pilot should be able to calculate W&B with emphasis on a lateral CG. The pilot must also correctly describe how to prepare the load, check the rigging, and attach that load to the helicopter.
4. The pilot should be able to identify the different types of webbing, nylon rope, chairs, clevises, and connector links. The pilot should have a general knowledge of the weight lifting capacity and the rigging of each.
5. For Class D authorizations, the pilot should know how to operate the personnel lifting device and be aware of its limitations.
6. The pilot must have thorough knowledge and understanding of the performance capability, operating procedures, and limitations of the helicopter to be used. The pilot should be able to calculate the adjusted gross weight performance when the temperature and/or density altitude changes.

2.4.3 Communications Test. The pilot must demonstrate an understanding of the ground crew's hand signals, as communication between the flightcrew and ground crew is critical in ensuring the safety of persons on the ground and in the helicopter. Class D authorization requires radio communication among flight and ground crewmembers,

and, if appropriate, the pilot must show that he or she is familiar with standard radio phraseology and with phraseology developed for the operation.

1. The pilot must have complete knowledge of all material in the approved RLCFM.
2. When all the requirements are satisfied, the skill test is conducted. Because of the elaborate preparations and equipment sometimes involved in external-load operations, the ASI may conduct the skill test after failure of the knowledge portion if special circumstances make it necessary. The skill test may only be conducted at this time if the deficient knowledge area is unrelated to the skill test.

2.4.4 Skill Test. The pilot must successfully perform flight operations for the appropriate load class in the helicopter for which certification is sought. For the purposes of the skill demonstration, the external-load weight, including the external-load attaching means, must be the maximum weight for which authorization is sought. The ASI can elect to conduct the skill test in the helicopter with the applicant or observe from the ground.

1. For a Class A external load, the skill test must consist of the following:
 - a. Before liftoff, the pilot should make a check of security and proper rigging of the load.
 - b. The rotorcraft and load must be lifted to an appropriate hover altitude where the pilot determines if power is available for takeoff.
 - c. While at a hover, the pilot must demonstrate that adequate directional control is available by making heading changes of 180 degrees to each side of the proposed takeoff path.
 - d. The pilot must demonstrate smooth acceleration from a hover into forward climbing flight. Sufficient power, not to exceed the maximum allowable, must be applied on takeoff to ensure that the aircraft clears the tallest immediate obstacle safely.
 - e. The pilot must demonstrate horizontal flight at the maximum operational airspeed for the load authorization requested.
 - f. The pilot must demonstrate normal and steep approaches.
2. For a Class B external load, the skill test must consist of the following:
 - a. During preflight, the pilot must demonstrate that both electrical and manual functions of the rotorcraft attachment system operate properly.
 - b. Before liftoff, the pilot should make a check of security and proper rigging of the load.
 - c. The pilot must demonstrate pickup of the external load. The load should be lifted slowly in a vertical ascent until the sling becomes taut and centered. The load is then lifted to an appropriate hover altitude where the pilot determines if power is available for takeoff.

- d. While at a hover, the pilot must demonstrate that adequate directional control is available by making heading changes of 180 degrees to each side of the proposed takeoff path.
 - e. The pilot must demonstrate smooth acceleration from a hover into forward climbing flight. Sufficient power, not to exceed the maximum allowable, must be applied on takeoff to ensure that the load clears the tallest immediate obstacle safely.
 - f. The pilot must demonstrate horizontal flight at the airspeed for which authorization is requested. As the airspeed is increased, low-density light loads generally tend to shift further aft and may become unstable. When the load is of greater density, more compact, and better balanced, the ride is steadier and the airspeed may be safely increased. Any unstable load may flutter, oscillate, or rotate, resulting in reduced aircraft control and undue stress on the helicopter. A reduction in forward airspeed will usually allow regaining of aircraft control and steadying of the load. If the load begins oscillating fore and aft or fluttering, it is especially important that the helicopter's forward airspeed be reduced.
 - g. The pilot must maneuver the external load into the release position and release it, under normal flight conditions, using the normal and, if practicable, emergency release controls.
 - h. The pilot must demonstrate winch operation if a winch is used to lift the external loads. The pilot and the winch operator, if appropriate, should each operate the winch during the test. Whenever the cyclic grip switch location or function has been modified, the pilot must demonstrate the ability to actuate the switch in normal operations and simulated emergencies without having to assume an unusual finger or thumb position that may induce unwanted control input.
3. For a Class C external load, the skill test must consist of the following:
 - a. The pilot must make a preflight check of the electrical and mechanical functions of the rotorcraft's attachment system.
 - b. The pilot must lift a portion of the load if it is to be dragged, or lift the entire load if it is ballast for a wire stringing operation.
 - c. The pilot must demonstrate lateral (sideward) flight with proper speed, heading control, and smoothness.
 - d. If the operator plans on towing (boats, barges), the pilot must demonstrate forward flight.
 - e. If a winch is installed, the pilot or winch operator must demonstrate its use.
 4. For Class D load authorization flight checks, the pilot must demonstrate the same maneuvers as indicated for Class B, including winch operations, if applicable. The test should include picking up a dummy load, moving this load to a predetermined area, and releasing the load under normal circumstances.

2.4.5 Rotorcraft and Equipment Inspection. (See Appendix C for more information about winches used for attaching external loads.)

1. Rotorcraft external-load attaching means must meet the requirements outlined in § 133.43(a).
2. While conducting external-load operations, the aircraft must have on board a facsimile of the approved Rotorcraft External-Load Operating Certificate (FAA Form 8430-21, Operating Certificate). This certificate constitutes a valid airworthiness certificate while the operator conducts external-load operations. It in no way invalidates the airworthiness certificate issued at certification. The facsimile, carried in the aircraft, is only valid while an external load is attached.

Note: The airworthiness certificate issued at certification must be displayed in accordance with part 91, § 91.203.

3. Each external-load attaching means must have been approved under one of the following:
 - Civil Air Regulations (CAR) part 8, Aircraft Airworthiness Restricted Category, on or before January 17, 1964;
 - Part 133, before February, 1977;
 - Part 27 or 29, as applicable, regardless of the approval date;
 - Supplemental Type Certificate (STC); or
 - FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).
4. Quick-Release Device: A quick-release device must have been approved under either of the following:
 - Part 27 or 29, as applicable; or
 - Part 133, before February 1, 1977.
5. Control for quick release must be installed in accordance with part 27, § 27.865. In addition, a manual mechanical control for the quick-release device must be readily accessible to either the pilot or another crewmember.

2.4.6 Operational Flight Checks (As Required by § 133.33). This flight check should be conducted while the ASI observes from the ground, unless the ASI determines observation from aboard the rotorcraft is absolutely necessary.

1. The pilot must ensure the gross weight and CG location of the rotorcraft-load combination (RLC) is within approved limits. They should also verify the external load is securely fastened and does not interfere with devices provided for its emergency release.
2. The pilot will make an initial lift off to verify that controllability is satisfactory.

3. The pilot will execute a 360-degree pedal turn (to the right or left, as appropriate) to verify that directional control is satisfactory while the rotorcraft is hovering.
4. The pilot should accelerate into forward flight to verify that no attitude (whether of the rotorcraft or the external load) is encountered in forward flight in which the rotorcraft is uncontrollable or which is otherwise hazardous.
5. In forward flight, check for hazardous oscillations of the external load, but if the external load is not visible to the pilot, other crewmembers or ground personnel may make this check and signal the pilot.
6. Increase the forward airspeed and determine an operational airspeed at which no hazardous oscillation or hazardous aerodynamic turbulence is encountered.

2.4.7 Initial Certification Base Inspection. For original certification, there are some items that cannot be inspected during a base inspection. For example, an applicant for a Rotorcraft External-Load Operating Certificate would not have certificate facsimiles or lists of authorized rotorcraft for examination.

2.4.8 Results of Inspections and Testing. The operator will be advised in writing of any unsatisfactory test or inspections. The unsatisfactory test or inspections should be rescheduled and repeated until satisfactory results are achieved.

2.4.9 Gate Complete. Verify all steps in the Demonstration and Inspection Phase are complete before continuing to the next phase (see Figure 2-4). The FSDO may end the certification process if the Demonstration and Inspection Phase has not been completed within 90 days. The completion of this gate triggers a new 14-day completion timeline for the Certification Phase.

2.5 Phase 5—Certification.

2.5.1 Successful Certification. When all certification requirements have been met, the FSDO will contact the Aviation Data Systems Branch (AFS-620) for a certificate number. The Operating Certificate expires on the last day of the 24th calendar-month after the date of issue (refer to § 133.13).

2.5.2 Web-Based Operations Safety System (WebOPSS). Authorizations were not previously issued to part 133 operators using WebOPSS; however, WebOPSS is used to provide a national standardized method for issuing regulatory authorizations (e.g., Class D or IFR). The use of WebOPSS also puts the operator into the national database for receiving safety advisories and alerts. In accordance with §§ 133.27(b) and 133.51, a copy of the Operating Certificate and Letter of Authorization (LOA) A003, Aircraft Authorization, must be carried aboard each rotorcraft when the rotorcraft is being used in operations conducted under this part.

2.5.3 Certificate Denial. If certification requirements are not met, the FSDO will notify the applicant in writing and provide specific reasons for the denial and cite 14 CFR sections where possible.

Section 1E. To Be Completed By All Applicants		
10. Additional information that provides a better understanding of the proposed operation or business <i>(attach additional sheets, if necessary)</i>		
11. The statements and information contained on this form denote an intent to apply for FAA certification.		
Signature	Date	Name and Title
Section 2. To Be Completed By FAA District Office		
Received by (district office):		Precertification Number
Date:		Date Coordinated with AFS-620
Remarks		

Figure 2-3. Sample Letter of Nomination for Designation as a Chief Pilot

[Operator's name]
[Operator's address]
[Operator's city, State, and ZIP Code]

[Date]

Federal Aviation Administration (FAA)
Flight Standards District Office (FSDO)
[FSDO address]
[FSDO city, State, and ZIP Code]

Dear Inspectors:

I am writing to inform you that, as part of our application for a Rotorcraft External-Load Operating Certificate, I wish to designate the following person as Chief Pilot, with your approval:

[Name, certificate grade, and number]

[Name] has accumulated over [XXXX] hours as pilot in command (PIC) of rotorcraft and most recently was employed as an external-load pilot for [name of other operator]. In this capacity, [name] flew [make and model]. [Name] completed the FAA knowledge and skill tests on [date].

All records of experience and training are available for the inspector's review.

Sincerely,

[Signature of operator]

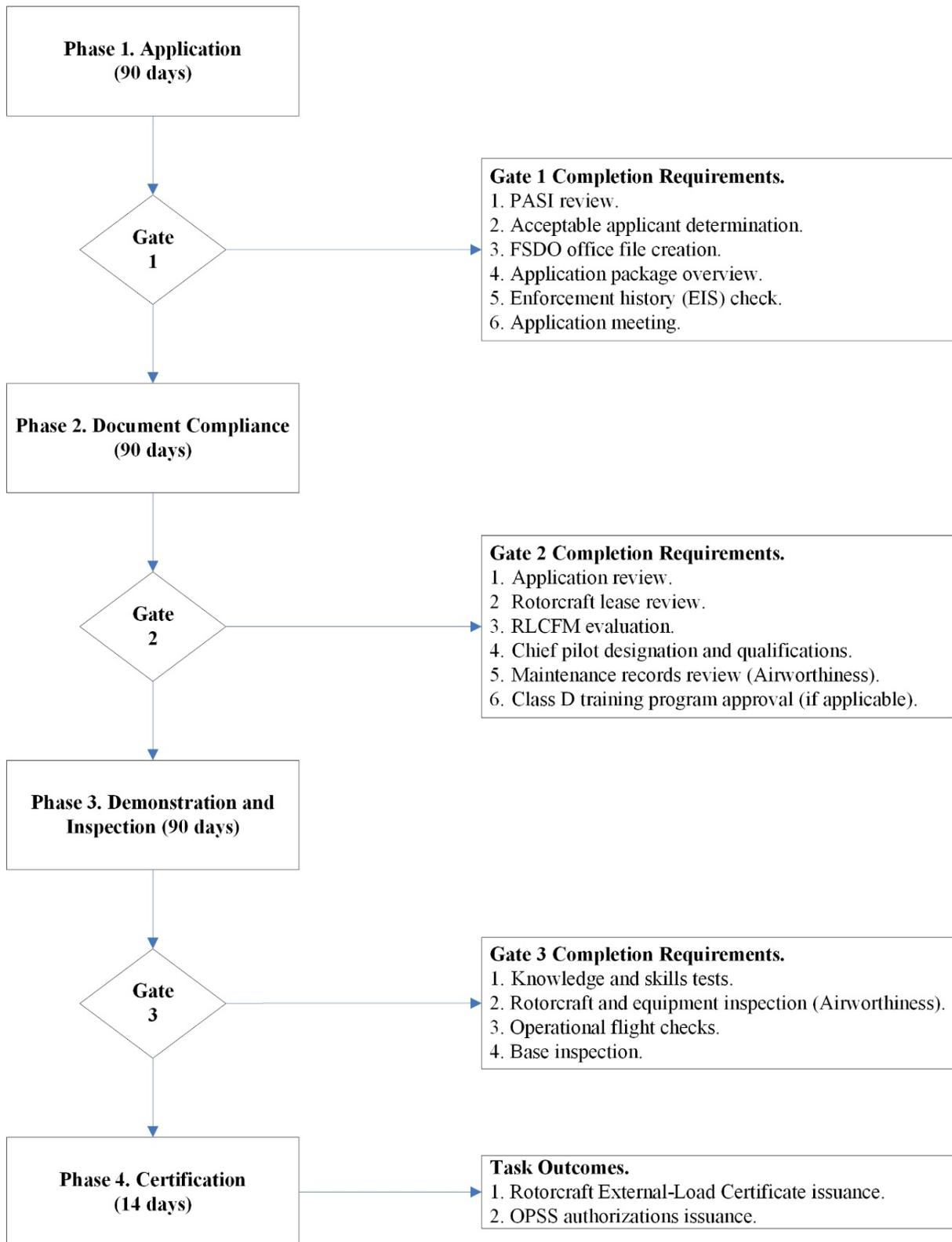
[Name]
[Title]

I accept this nomination for designation as Chief Pilot.

[Signature of Chief Pilot]

[Name of Chief Pilot]

Figure 2-4. Certification Process Flowchart



CHAPTER 3. OPERATING RULES AND REQUIREMENTS

3.1 Operating Rules. Title 14 CFR part 133, § 133.33(c) pertains to operational requirements and refers to the operational flight checks that each person must initially demonstrate in a manner that does not endanger persons or property on the surface. This operational flight check applies to any rotorcraft-load combination (RLC) that differs substantially from any that person has previously carried with that type of rotorcraft as described in paragraph 2.4.6 of this AC.

1. An example of Class B loads that do not differ substantially from each other is an air conditioner versus an electrical transformer. Both these loads are non-aerodynamic and not considered substantially different.
2. An example of loads that could differ substantially is an air conditioner versus a large pane of glass or other lightweight loads. These loads are substantially different because the pane of glass can be aerodynamic under certain conditions.

Note: When the loads differ substantially, a flight characteristics check may also be required in accordance with § 133.41.

3.2 Congested Area Operations.

3.2.1 Requirements for Congested Area Operations. Section 133.33(d) establishes the requirements for conducting external-load operations over congested areas. Each operation is required to be conducted under a plan that must be approved by the Flight Standards District Office (FSDO) having jurisdiction over the area in which the operation is to be conducted. It is not intended that a separate plan be required for each flight. One plan will suffice for an operation that might require several flights to complete. Each plan should provide sufficient information for a thorough evaluation of all safety matters. A chart depicting flight routes and altitudes should be included in each operating plan. Aeronautical charts may be used if the scale and detail is sufficient for evaluation purposes. Past experience has shown that city maps distributed by oil companies are excellent for congested area operating plans. Lack of adequate charts may make it necessary to use a hand-drawn chart to identify routes over city streets, railroad tracks, riverbeds, etc. In order that each congested area operating plan may be properly evaluated, it should be submitted at least 5 business-days in advance of the proposed operation to the appropriate office.

3.2.2 Restricted Category Helicopter Considerations. Section 133.45(d) states, “No person may conduct an external-load operation under this part with a rotorcraft type certificated in the restricted category under § 21.25 over a densely populated area, in a congested airway, or near a busy airport where passenger transport operations are conducted.” The following considerations should be clearly understood by restricted category helicopter operators:

1. During the development of part 133, it was necessary to consider the application of the minimum safe altitude rules of 14 CFR part 91, § 91.119 as they would apply to flight operations over congested areas. Specifically, it was necessary to provide exceptions for external-load operations over both congested areas and other than congested areas. The first was accomplished in § 133.33(d), which authorizes congested area operations under specified conditions for helicopters type certificated (TC) under 14 CFR part 27 or 29. A restricted category (14 CFR part 21) helicopter is ineligible for use over congested areas during external-load operations. Secondly, § 133.33(e) was designed to allow for external-load operations below those altitudes otherwise prohibited by § 91.119 which do not create a hazard to persons or property on the surface. This rule is applicable to normal and restricted category helicopters alike.
2. Section 91.313(e) prohibits the operation of restricted category civil aircraft over densely populated areas, in congested airways, or near a busy airport where passenger transport operations are conducted, except when operating in accordance with the terms and conditions of a Certificate of Waiver (CoW) or special operating limitations issued by the Administrator. External-load operators are eligible for such waivers applicable to restricted category helicopters, as are the operators of any other restricted category aircraft. In the case of the external-load operator, such a waiver is applicable to all operations otherwise prohibited by § 91.313(e), except when that operator is engaged directly in external-load operations. Section 133.45(d) reinforces the prohibition of § 91.313(e) for external-load operations, and waiver provisions are not authorized.
3. Access routes (ingress/egress) to the site of an external-load operation should not be construed to be a part of the external-load operation. Access to and from the worksite not involving an external load operation should be considered a part 91 operation.

Note: To review: A restricted category helicopter may not be used by an external-load operator for external-load operations in any circumstance over congested areas, over densely populated areas, in congested airways, or near busy airports where passenger transport operations are conducted.

3.2.3 Congested Area. The term “congested area” has been applied on a case-by-case basis since it first appeared in the Air Commerce Regulations of 1926; a more precise mathematical or geographic definition has yet been developed. The term has never been defined in any regulation. However, the following guidelines have been applied by the Civil Aeronautics Board (CAB) (now the National Transportation Safety Board (NTSB)) in attempting to give the term fair and equitable effect:

1. The term is administered so as to protect persons and property in small, sparsely settled communities, as well as persons and property in large metropolitan areas, from the hazards presented by aircraft. Thus, the size of the area is not controlling, and violations of the rule have been sustained

- for operation of aircraft: (i) over a small congested area consisting of approximately 10 houses and a school; (ii) over the campus of a university; (iii) over a beach area along a highway; and (iv) over a summer camp where there were numerous people on the docks and children at play on shore.
2. The presence of people is important to the determination of whether a particular area is congested. Thus, no violation was found in the case of a flight over a large shop building and four one-family dwellings because, in the words of the CAB Examiner, “it was not known whether the dwellings were occupied.” In that case, the area surrounding the buildings was open, flat, and semi-arid. For external-load operations, a factory with adjacent occupied parking lots, filled with employees and vehicles, might be considered a congested area unless the parking lots and employees are vacated and necessary precautions taken to prevent vehicles and persons from reentering the area.
 3. The term is administered to prohibit overflights that cut the corners of large, heavily congested residential areas.
 4. As stated in § 91.119(b), the congested area could be any area of a city, town, or settlement. However, no precise density of population, ground traffic, or congestion, or precise description of the proximity of buildings or number of residences, has yet been devised that will achieve both the intended protection of persons and property on the ground, and fair application of the rule to operators of aircraft.
- 3.2.4** Densely Populated Areas. A densely populated area could be considered almost synonymous with a congested area. Those areas of a city, town, or settlement which contain a large number of occupied homes, factories, stores, schools, university and hospital-type buildings, and other related business structures, might be considered densely populated areas. Additionally, a densely populated area may not contain any buildings, but could consist of a large gathering of persons, such as on a beach area or at an airshow, a ball game, fairgrounds, etc.
- 3.2.5** Near a Busy Airport Where Passenger Transport Operations Are Conducted. An external-load operation conducted within an airport’s Class D airspace could be considered “near” in the application of § 133.45(d). External-load operations cannot be conducted within such an area when passenger transport operations (air carrier and air taxi) are being conducted to or from those airports. Accordingly, the operator must be advised that advance coordination with the controlling air traffic control (ATC) facilities will be necessary to ensure the establishment of proposed hours of external-load operations, and that adequate procedures will be utilized to ensure that no external-load operation is conducted when passenger transport operations to or from the airport are in progress. Passenger transport operations will be considered “in progress” whenever an aircraft engaged in such operations is in flight within the above defined areas, and the operator is so advised by ATC.

- 3.2.6** Congested Area Plan (CAP). For congested area operations, the operator must develop a plan for each complete operation, coordinate this plan with the FAA FSDO having jurisdiction over the area in which the operation will be conducted, and obtain approval for the operation from that district office. The plan must include a Letter of Agreement (see Figure 3-2, Letter of Agreement for Congested Area) with the appropriate political subdivision that local officials will exclude unauthorized persons from the area in which the operation will be conducted, coordination with ATC, if necessary, and a detailed chart depicting the flight routes and altitudes.

Figure 3-1. Sample Congested Area Plan

(Submit in duplicate.)

Name, Address, Telephone Number of Operator: _____

Name, Address, Telephone Number of Contractor: _____

Rotorcraft Identification Number: N _____

Rotorcraft Make and Model (HU-369D, etc.): _____

Rotorcraft Airworthiness Category (Normal, Restricted, Transport): _____

Pilot Name and Certificate Number: _____

DATES AND TIMES OPERATION WILL BEGIN AND TERMINATE:

Date	Time begin	Time end
_____	_____	_____
_____	_____	_____
_____	_____	_____

Name, title, and telephone number of appropriate official of the local subdivision who has agreed to exclude unauthorized persons from the operational area, if applicable: _____

Copy of agreement attached? Yes/No

List of streets or roads that will be blocked during operation, if applicable: _____

Ingress/egress routes, if applicable: _____

(If appropriate) This operation has been coordinated with the following air traffic control facilities: _____

Description and weight of loads to be carried: _____

Class: _____

Description: _____

Length of attaching means (includes hook and cable): _____

Weight of load: _____

Physical size of load: _____

List of buildings that must be either partially or entirely unoccupied by persons: _____

Building description/address: _____

Owners: _____

Telephone number: _____

Load penetration (for occupied buildings): _____

How many floors could the load penetrate if dropped from the highest point of lift above the building? _____ floors

What is the maximum height the load will be lifted above the building? _____ feet

Are charts, maps, and/or diagrams attached? Yes/No

Narrative description of pickup site, route, delivery site, and plan for ceasing operation if unauthorized persons enter operational area: _____

(Use additional sheets as necessary.)

[Company official's signature]

[Title]

[Date]

Sample Diagram of Congested Area Plan

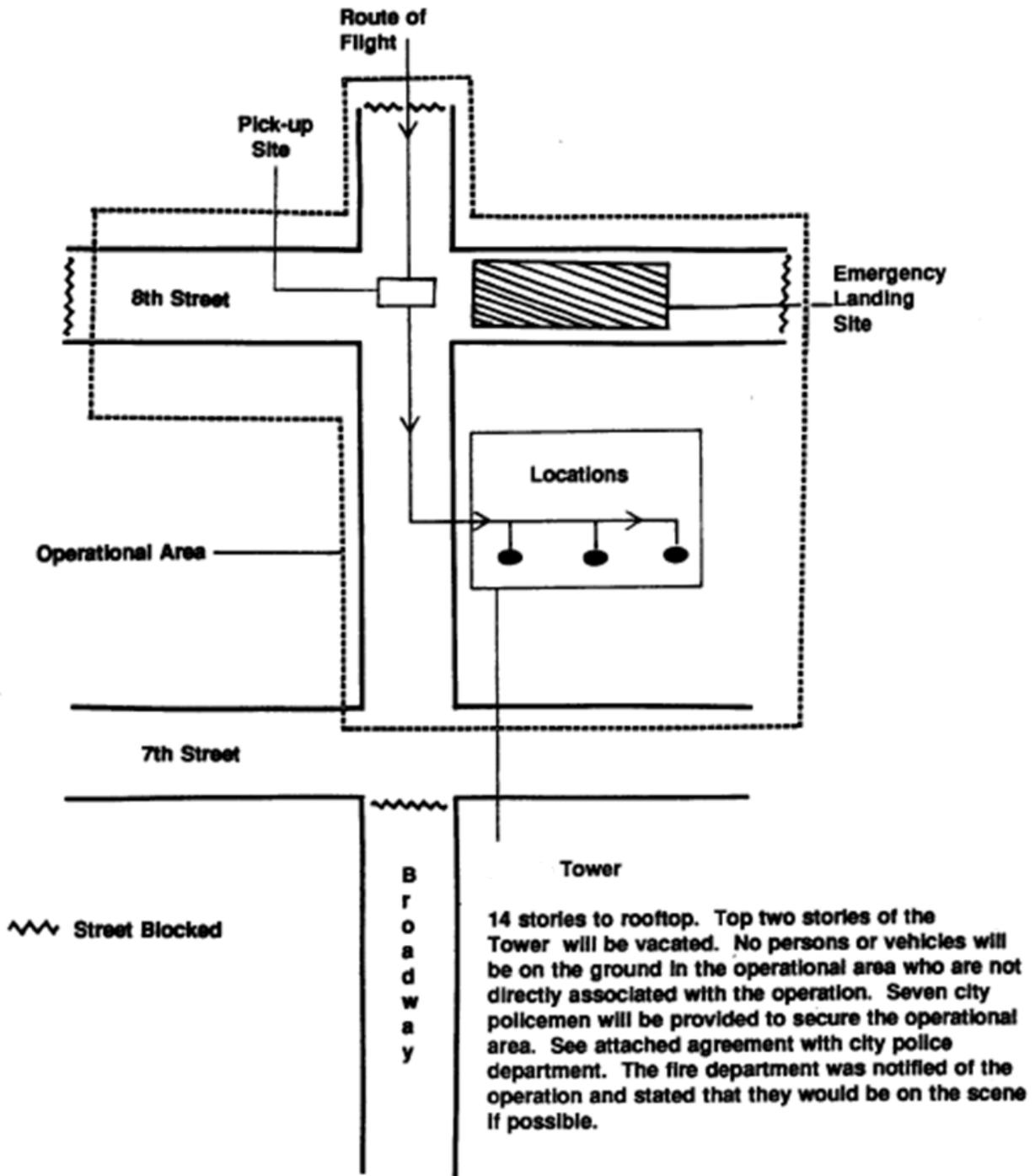


Figure 3-2. Letter of Agreement for Congested Area

LETTER OF AGREEMENT FOR CONGESTED AREA

Personnel of the [name of the political subdivision] agree to exclude all unauthorized persons from the operational area described on the attached CAP, which was prepared for rotorcraft external-load operations. I understand that the operations will be conducted on [dates] and remove the operator's responsibility to exclude all unauthorized persons from the operational area.

[Signature of official]

[Name of official]

[Title of official]

[Date]

3.3 Carriage of Persons.

3.3.1 Passenger Carrying Versus Carriage of Persons. Part 133 does not provide for "passenger-carrying" operations, but does provide for the "carriage of persons" in accordance with § 133.35. If conducting passenger-carrying operations, the operation must comply with part 91 or 135. No Class A, B, or C external-load operator may allow passenger carrying during external-load operations unless the person carried is a flightcrew member, is a flightcrew member trainee, performs an essential function in connection with the external-load operation, or is necessary to accomplish the work activity directly associated with the external-load operation. An operator with Class D external-load approval may receive authorization to transport persons externally who are other than a crewmember or not directly associated with the external-load operation.

3.3.2 Class B Human External Cargo (HEC). Under § 133.35, an operator with a Class B approval is authorized to externally carry a crewmember, a person essential to the external-load operation, or a person who is necessary to accomplish the work activity directly associated with that operation with a single-engine or multiengine rotorcraft, in accordance with applicable operating limitations. If Rotorcraft Flight Manual (RFM) or RFM Supplement (RFMS) operating limitations, markings, or placards contain language prohibiting use for HEC, operators of civil rotorcraft must comply with those limitations in accordance with § 91.9(a) (e.g., an RFMS limitation such as, "the cargo hook is approved for non-human cargo, Class B rotorcraft-load combinations only"). The RFM or RFMS may also include additional limitations indicating certification for HEC (e.g., "the external load system meets the 14 CFR part 27 certification requirements for HEC"). The operator may carry the persons in the following examples as a Class B external load, which must be jettisonable:

- Power line patrol/maintenance personnel.
- Rescue personnel who are performing emergency medical and rescue services.

3.4 Human External Cargo (HEC).

3.4.1 Class D Load Combination Operations. As with other load combinations, Class D operations must be authorized per § 133.17. Additionally, the operator is required to have an FAA-approved initial and recurrent training program. Any pilot conducting Class D operations must be current in accordance with the training requirements of § 133.37. Finally, the rotorcraft must meet the equipment requirements of § 133.45(e) and the Rotorcraft-Load Combination Flight Manual (RLCFM) must contain information essential for safe operation with Class D loads.

Note: Part 133 operations under instrument flight rules (IFR) must be specifically approved by the FAA; however, no person may be carried as part of an external load under IFR.

3.4.2 Class B Load Combination Operations. As with other load combinations, Class B operations must be authorized per § 133.17. The test for determining whether it is appropriate to conduct a human external load as a Class B versus a Class D external-load combination operation is to consider the standard industry practices for the work activity being accomplished. If the person is performing an essential function in connection with the external-load operation or is necessary to accomplish the work activity directly associated with that external-load operation, the operator may be authorized to transport the person as a Class B external-load combination. If the person is not performing an essential function in connection with the external-load operation or is not necessary to accomplish the work activity directly associated with that external-load operation, then the operator would be required to transport the person as a Class D external-load combination if that person is transported externally.

3.4.2.1 Class B HEC has become an essential tool within the rotorcraft-helicopter industry and when conducted utilizing best safety practices has proven to be a safe and efficient means of transport. Pilots and operators should conduct a thorough safety analysis of any proposed Class B HEC operation to ensure that the use of Class B HEC is appropriate to the mission and that a proper hazard identification and risk analysis has been conducted.

3.4.2.2 When conducting Class B HEC operations, it is important to understand the current regulatory requirements. Section 133.23 states the applicant must demonstrate to the Administrator satisfactory knowledge and skill regarding rotorcraft external-load operations. An operator that conducts HEC operations must demonstrate the specific knowledge and skill for safe HEC operations as part of the knowledge and skill test.

3.4.2.3 Section 133.33 states that before a person may operate a rotorcraft with an external-load configuration that differs substantially from any that person has previously carried with that type of rotorcraft (whether or not the RLC is of the same class), that person must conduct, in a manner that will not endanger persons or property on the surface, flight operational checks as the Administrator determines are appropriate to the RLC. Class B HEC load

combinations differ substantially from other Class B rotorcraft loads and require an operational flight check.

3.4.2.4 Section 133.41 states the applicant must demonstrate to the Administrator, by performing the operational flight checks prescribed, as applicable, that the RLC has satisfactory flight characteristics. HEC operations must be demonstrated utilizing a simulated load (ballast) on the personnel lifting device to verify satisfactory flight characteristics, unless these operational flight checks have been demonstrated previously and the RLC flight characteristics were satisfactory. For the purposes of this demonstration, the external-load weight (including the external-load attaching means) is the maximum weight for which authorization is requested.

3.4.2.5 Section 133.47 states that the applicant must prepare an RLCFM and submit it for approval by the Administrator. The RLCFM must set forth any other information essential for safe operation with external loads. With regard to HEC operations, this information should include at a minimum:

1. Class B HEC Operations.
2. Class B HEC Training:
 - Pilot training.
 - Crewmember training.
 - Recurrent training.
 - Recent experience.
3. Personnel Qualifications:
 - Pilot qualifications.
 - Crewmember qualifications.
4. Class B HEC Briefings.
5. Operational Safety Considerations.
6. Communications.

3.4.2.6 Helicopter operators should select only those pilots that have demonstrated a sufficient level of experience, skill, and ability within Class B vertical reference operations. Class B HEC pilot training should be conducted by an operator's Chief Pilot or the Chief Pilot's qualified designee. Pilot training should be conducted and documented in accordance with the operator's Class B HEC training program and should contain, but is not limited to, the following minimum curriculum:

3.4.2.6.1 Pilot training:

1. Knowledge and skill training.
2. Demonstrated proficiency with precision vertical reference load placement.
3. Proper load configuration, use, and application of Class B HEC.
4. Installation, inspection, and operation of secondary safety device(s).
5. Acceptance or rejection criteria of HEC attaching means to include long lines, chairs, and/or harnesses.

Note: See Appendix C, Possibility of D-Ring Reversal or Dynamic Rollout During Winching or Long Line Operations, for information about winch operation.

6. Hazard identification, risk analysis, and mitigation.
7. Crew Resource Management (CRM).
8. Communication.
9. Normal/abnormal and emergency procedures pertinent to Class B HEC operations.
10. Electrical wire environment hazards.
11. Fuel management.

3.4.2.6.2 Crewmember training. Crewmembers working on or around the helicopter should be trained by a competent person in the following areas:

1. Acceptance or rejection criteria of HEC attaching means to include long lines, chairs, and/or harnesses.
2. Task-specific operations.
3. Hazard identification, risk analysis, and mitigation.
4. CRM.
5. Communication:
 - Emergency procedures pertinent to Class B HEC operations.
 - Ground.
 - Flight.

6. Mock-up training and review of:
 - Rigging inspection and acceptance or rejection criteria of equipment.
 - Communication procedures.
 - Simulation of task (both crew and pilot tasks).
7. Documented completed proficiency on all of the above.

Note: Each operator is responsible to ensure that the individuals providing crewmember training have sufficient experience with Class B HEC operations, safe rigging, and fall protection. Additionally, competent instructors should have working knowledge and understanding of the particular risks associated with the specific operation being conducted.

- 3.4.2.6.3** Recurrent training. Both pilots and crew members should receive recurrent Class B HEC training annually. Additional training should be conducted and documented for each new operation type, equipment change, or when the mission profile is significantly modified.
- 3.4.2.6.4** Recent experience. Each operator should have a recent experience program that is designed to ensure each pilot and crewmember is prepared to perform Class B HEC safely and has conducted Class B HEC or equivalent precision operations within a specified period of time. An individual's recent experience must be obtained from the company's specific operations and should not carry over from outside experience.
- 3.4.2.6.5** Pilot qualifications. Helicopter pilots selected to perform Class B HEC operations should have previous experience with HEC operations and should be trained for safe operations within the HEC operating environment. Operators should establish minimum sufficient experience levels to serve as a basic qualification threshold. Considerations of such minimum experience may include:
 - 2,000 hours as pilot in command (PIC) in helicopters.
 - 500 hours of vertical reference long line experience.
 - 200 hours as PIC in specific type of the helicopter to be used in the Class B HEC operation.
 - 200 hours as PIC conducting precision vertical reference, long line operations.
 - Knowledge of the hazards and "hands-on" operations to be conducted.
 - Fitness for duty and physical or psychological limitations (IMSAFE).

- Communications limitations.
- Understanding of the five hazardous attitudes and their antidotes: anti-authority, impulsive, invulnerability, macho, and resignation.

3.4.2.6.6 Crewmember Qualifications:

1. Not all crewmembers will be comfortable with or qualified to perform Class B HEC operations. All crewmembers should be selected for Class B HEC operations on a voluntary basis. Crewmembers selected should be qualified for Class B HEC operations based on:
 - Experience level.
 - Knowledge of aircraft limitations, including weight limitations to meet aircraft performance limitations.
 - Knowledge of the “hands-on” operations to be conducted.
 - Fitness for duty and physical or psychological limitations (IMSAFE).
 - Communications limitations.
 - Understanding of the five hazardous attitudes and their antidotes: anti-authority, impulsive, invulnerability, macho, and resignation.
2. Thorough training of both pilots and crewmembers is critical to safely conducting Class B HEC operations. The following topics should be developed and integrated into an operators Class B HEC training program:
 - General helicopter safety training,
 - Applicable regulations pertaining to Class B HEC operations, and
 - Company-specific requirements and limitations.

3.4.2.6.7 Class B HEC briefings. The daily briefing should be attended by all persons involved in the operations for that particular day. The briefing should cover concerns, identified risks, and hazards. Additionally, this briefing should cover:

1. Definition of the core operational and individual tasks for the day.
2. Identification of specific hazards.
3. Discussion of hazard and risk mitigation.
4. Communication issues.
5. Weather conditions and forecasts (i.e., wind gusts, lightning, or other weather factors that could increase risk).
6. Any revisions to the site-specific safety plan.

7. Universal “go/no-go” authority.
8. Pre-operation reconnaissance flight.
9. Personal protective equipment (PPE) appropriate for the task.
10. Review of key points of the Emergency Action Plan.
11. Weight and Balance (W&B) calculation.

Note: An additional briefing should be conducted upon any significant change in the daily operations which was not covered by the daily briefing.

3.4.2.6.8 Operational safety considerations. When selecting crewmembers for Class B HEC, care should be given to ensure that those individuals with the least experience and knowledge be paired with qualified crewmembers experienced in Class B HEC operations (no green on green). Each aircraft used for Class B HEC operations should be subject to daily engine power assurance checks and trend monitoring.

3.4.2.6.9 Communications. Prior to any Class B HEC operation, it is essential that all crewmembers and the pilot have established a clear method of communication. This may consist of hand signals and/or two-way radio communications. Communications should be tested prior to each day’s operation. When there are communication failures or confusion, operations should be suspended until clear communications are restored.

3.5 Night Operation Considerations, Limitations, Training, and Risk Mitigation Procedures (if applicable).

1. It is more dangerous to conduct rotorcraft external-load operations during darkness; therefore, extensive training and detailed planning become increasingly important. In accordance with § 133.47, the RLCFM must set forth any other information essential for safe operation with external loads. With regard to night operations, this information should include, at a minimum, adequate considerations, limitations, training, and risk mitigation procedures describing how the operator will conduct operations at night.
2. It is important to realize that certain problems will exist at night that do not occur during daylight operations. Common night problems include increased time required for hookup, tendency for the helicopter to drift during hover, and lack of depth perception for crewmembers and ground personnel. During night operations, hand-and-arm signals are the same as daylight operations except that flashlight wands or other visible light sources are used.
3. Whenever possible, and if the situation permits, personnel should wear reflective vests. Manmade securable lighting (e.g., chemlights, battery powered light source, etc.) attached to the top of the load assists the aircrew in identifying the load; likewise, a chemlight attached to the cargo hook aids the hookup team during the hookup operation. Some helicopters are equipped

with lights positioned by the cargo hook. The aircrew identifies the cargo hook by illuminating the cargo hook light.

3.6 Public Aircraft Operations (PAO).

1. Section 133.1 prescribes that part 133 subpart B, Certification Rules (§§ 133.11–133.27) do not apply to a Federal, State, or local government conducting PAO. However, operators conducting PAO must still comply with part 133 subparts A, C, and D.
2. PAO are required to comply with part 133 subparts A, C, and D. For further information, refer to AC 00-1.1, Public Aircraft Operations. Each external-load attaching means must be approved as specified in § 133.43.
3. Any government or public entity conducting civil operations must hold a part 133 certificate in order to conduct external-load operations. This obligates them to comply with all sections of part 133.

CHAPTER 4. AIRWORTHINESS REQUIREMENTS

- 4.1 Operations Flight Characteristic Demonstration.** Title 14 CFR part 133, § 133.41(a) pertains to airworthiness requirements and refers to the flight characteristics as it relates to each rotorcraft-load combination (RLC) for a specific rotorcraft type. Approval of each RLC requires a demonstration flight showing satisfactory flight characteristics for that RLC. For the purposes of this demonstration, the external-load weight, including the external-load attaching means, must be the maximum weight for which authorization is sought.
- 4.1.1 Documentation of Previous RLC Demonstrations.** Documentation of any approved RLC demonstrations that were obtained from manufacturer's data in the Rotorcraft Flight Manual (RFM) or documentation showing satisfactory results issued to another operator by the Administrator for that specific RLC satisfy the requirements of § 133.41(a). Therefore, operators need not comply with the requirements for a demonstration flight if the manufacturer has already performed this demonstration. The RFM for each rotorcraft contains this information.
- 4.1.2 Unsatisfactory Documentation.** If the RLC flight characteristic check has not been satisfactorily documented as described above, then the applicant must demonstrate the flight characteristic checks to the Administrator to meet this requirement. When the applicant conducts the demonstration, they must use their direct employees or agents.
- 4.1.3 Demonstration of Quick-Release Device.** In addition, the external-load attaching means must be appropriately certificated and a satisfactory demonstration must be performed in accordance with §§ 133.41 and 133.43. The flight characteristics demonstration should evaluate the pilot actuating each quick-release device under simulated emergency conditions. Whenever the quick-release switch location or function is modified, operators should ensure that their pilots re-demonstrate their ability to actuate the switch in normal and simulated emergency operation without inducing unwanted control inputs.
- 4.2 Rotorcraft Type Certification Requirements.** All rotorcraft external-load operations conducted in the United States by any person must comply with the operating and airworthiness rules of part 133. Most operations, with the exception of those listed in § 133.1(c), must also comply with the certification rules of part 133 and hold a Rotorcraft External-Load Operating Certificate. Certificates issued under part 133 are valid for a period of 24 calendar-months per § 133.13.
- 4.2.1 Airworthiness Certification Rules.** Part 133 prescribes airworthiness certification rules for rotorcraft used in rotorcraft external-load operations in the United States. This part further provides that an applicant must have the exclusive use of a rotorcraft type certificated (TC) under 14 CFR part 27, part 29, or part 21, § 21.25.
- 4.2.2 Background.**
1. Under previous regulations, rotorcraft could not be operated with external loads for compensation or hire unless the RLC has been approved under the provision of Civil Air Regulations (CAR) part 6, Rotorcraft Airworthiness:

Normal Category, and part 7, Rotorcraft Airworthiness: Transport Category, or in not-for-hire operations under § 21.25(b). It was pointed out that the burden and expense of obtaining such approval may be unnecessarily severe and that safety would not be compromised if less restrictive airworthiness requirements were established.

2. Recognizing that the type certification rules prescribed in CAR parts 6 and 7 might be unduly restrictive when applied to rotorcraft with external-load provisions, part 133 was adopted containing airworthiness standards for the approval of rotorcraft external-load operations and appropriate operating limitations for such rotorcraft. Part 133 requires an applicant to demonstrate satisfactory flight characteristics with various external-load combinations that are usually in addition to demonstrations required by parts 27 and 29.

4.2.3 Standard Category Aircraft. Upon successful completion of all applicable requirements of part 133, an applicant is eligible for a Rotorcraft External-Load Operating Certificate. This certificate becomes a current and valid airworthiness certificate for each standard category rotorcraft listed in that certificate when the rotorcraft is used in operations under part 133.

4.2.4 Restricted Category Aircraft. In accordance with § 21.25, an applicant is entitled to a TC for an aircraft in the restricted category for special purpose operations if he or she shows compliance with the applicable noise requirements of 14 CFR part 36; the applicant shows that no feature or characteristic of the aircraft makes it unsafe when it is operated under the limitations prescribed for its intended use; and the aircraft meets the airworthiness requirements for the special purpose(s) for which the aircraft is to be used or has been manufactured in accordance with the requirements of, and accepted for use by, a branch of the Armed Forces of the United States, and has been later modified for a special purpose.

4.2.4.1 **Special Purpose Operations.** As authorized under the provisions of § 21.25, special purpose operations for restricted category aircraft include the following:

1. Agricultural use (includes the special purpose operations of crop spraying, dusting, and seeding; livestock and predatory animal control; insect control; dust control; and protection of crops).
2. Forest and wildlife conservation (includes the special purpose operations of aerial dispensing of liquids, heli-logging, fish spotting, wild animal survey, and oil spill response).
3. Aerial surveying (includes the special purpose operations of photography, mapping, oil and mineral exploration, atmospheric survey and research, geophysical and electromagnetic survey, oceanic survey, and airborne measurement of navigation signals).
4. Patrolling (includes patrolling pipelines, power lines, and canals).
5. Weather control (includes cloud seeding).

6. Aerial advertising (includes the special purpose operations of skywriting, banner towing, airborne signs, and public address systems).
7. Any other operation specified by the FAA. The following purposes are approved under § 21.25(b)(7):
 - Rotorcraft external-load operations (part 133).
 - Carriage of cargo (incidental).
 - Target towing.
 - Search and Rescue (SAR) (nontransport).
 - Space vehicle (SV) launch.
 - Glider towing.
 - Alaskan fuel hauling.
 - Alaskan Fixed-Wing External Loads (FWEL).

Note: Rotorcraft certificated in the restricted category for the special purpose of external-load operations under § 21.25(b)(7) are issued restricted category airworthiness certificates.

4.3 External-Load Attaching Means.

4.3.1 Definition. External-load attaching means are the structural components used to attach an external load to an aircraft, including external-load containers, the backup structure at the attachment points, and any quick-release device used to jettison the external load. This includes any structure, mounts, hooks, hoists, and lines used to connect the external load.

4.3.2 Certification. Rotorcraft external-load attaching means must meet the requirements outlined in § 133.43(a). While conducting external-load operations, the aircraft must have on board a facsimile of the approved Rotorcraft External-Load Operating Certificate (FAA Form 8430-21, Operating Certificate). This certificate constitutes a valid airworthiness certificate while the operator conducts external-load operations. It in no way invalidates the airworthiness certificate issued at certification. The facsimile, carried in the aircraft, is only valid while an external load is attached to the aircraft. The standard airworthiness certificate issued at certification must be displayed in accordance with 14 CFR part 91, § 91.203. Each external-load attaching means must have been approved under one of the following:

- CAR part 8 on or before January 17, 1964;
- Part 133, before February 1977;
- Part 27 or 29, as applicable, irrespective of the date of approval;
- Section 21.25;

- Supplemental Type Certificate (STC); or
- FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).

4.4 Quick-Release Devices.

4.4.1 Background. The rotorcraft operator must be able to jettison the load quickly in an emergency condition. A quick-release mechanism is installed to meet this requirement. By rule, the quick release requires the operator to perform two distinct movements or operations to release the load.

4.4.2 Certification. A quick-release device must be approved under one of the following:

- Part 27 or 29, as applicable;
- Part 133, before February 1, 1977; or
- Section 21.25, except the device must comply with part 27, § 27.865(b) or part 29, § 29.865(b), as applicable.

Note: A control for quick release must be installed in accordance with § 27.865 or § 29.865. In addition, a manual mechanical control for the quick-release device must be readily accessible to either the pilot or another crewmember.

4.5 Portable Safety Devices (PSD)/Belly Bands.

4.5.1 Development of Belly Bands. The primary attaching means must be capable of securely retaining the load, and must also be able to jettison the load very quickly in an emergency condition. Inadvertent release of the load, especially a human external cargo (HEC) load, is an obvious safety problem. At the same time, an inability to release the load in an emergency is also an obvious safety problem. To overcome the inadvertent release problem, external-load operators began using a device in addition the primary attaching means, commonly called a belly band. This device is similar to a belt or strap. It goes through the cabin, wraps around the fuselage, and hangs below the aircraft between the landing gear. The cable that attaches the external load to the rotorcraft is called a long line. In HEC operations, the long line is attached to both the cargo hook and the belly band. Should the cargo hook release inadvertently, the HEC is retained by the belly band.

4.5.2 Use of Belly Bands. The belly band is authorized to be used in addition to the primary attaching means for HEC external load operations. A belly band system, also known as an emergency anchor, is classified as a PSD. The PSD is intended to improve HEC safety by reducing the chance of an accidental death in case the primary attaching means release system fails. The PSD is not TC'd and an STC is not required since PSDs are not permanently installed. The use of a PSD is at the operator's discretion in addition to the attaching means and quick-release certification requirements as an option to mitigate risk.

- 4.5.2.1** Use of a PSD is not required for HEC operations. However, if you choose to use a PSD, the operator must ensure that it does not endanger the safe operation of the aircraft. This would include an evaluation to show that the load is transportable and releasable, when necessary, without hazard to the helicopter during both normal and emergency flight conditions. This evaluation would be conducted as part of the flight characteristics demonstration flight required by § 133.41(c)(6).
- 4.5.2.2** However, along with the jettison requirements of the primary attaching means, a PSD should also be evaluated by the operator to ensure:
- The materials meet the accepted industry standard of National Fire Protection Association (NFPA) 1983, Standard on Life Safety Rope and Equipment for Emergency Services, or equivalent;
 - The system includes installation requirements and instructions necessary for continued serviceability;
 - There are provisions for a quick release;
 - There is an ability to jettison without endangering the helicopter; and
 - There is no sudden and/or unacceptable shift in the center of gravity (CG).
- 4.5.2.3** To fully realize the safety benefits of the PSD, it must be adequately maintained.
- 4.5.2.4** The crews utilizing the device must be trained. In addition, operators should apply the additional equipment upgrades associated with HEC.
1. Inspect and maintain the PSD. The operator should inspect and maintain PSDs as necessary to ensure they function properly and safely to protect crewmembers. This also ensures that the PSDs will not adversely affect the safe operation of the helicopter.
 2. Develop operational training procedures for use of the PSD. The operator should develop operational training procedures that include procedures for emergency release of the PSD and the primary attaching means in case either system fails to release.
 3. Additional cargo hook equipment upgrades (see § 27.865):
 - Substantiate a higher static limit load (3.5 load limit) for the external-load attaching means and corresponding personnel carrying device system;
 - Incorporate separate dual actuation devices in both the primary and backup quick-release systems in the aircraft;
 - Substantiate more stringent electromagnetic interference and lightning protection for the quick-release system in the aircraft;

- Use a personnel carrying device system with improved structural integrity and personnel safety features.
- Conduct a fatigue evaluation of the aircraft quick-release system, attaching means, and personnel carrying device system.

4.6 Airworthiness Regulations and Limitations. The aircraft must be Airworthy, including the certification requirements of parts 27 and/or 29, for the operations conducted. Sections 27.865 and 29.865 prescribe rules that must be complied with for external loads. AC 27-1, Certification of Normal Category Rotorcraft, and AC 29-2, Certification of Transport Category Rotorcraft, explain in greater detail the requirements of §§ 27.865 and 29.865. Additionally, the aircraft is required to be operated in accordance with the limitations section of the RFM including any RFM Supplements (RFMS). Operations of an aircraft when the aircraft is not Airworthy or equipped for the operation, or when not in compliance with the RFMS limitations, may be a violation of FAA regulations.

APPENDIX A. SAMPLE ROTORCRAFT-LOAD COMBINATION FLIGHT MANUAL

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4. Other Information Essential to Operational Safety
5. Ground-to-Air Hand Signals
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Sample Rotorcraft-Load Combination Flight Manual

Section 1. Operating Limitations

In addition to the operating limitations set forth in the approved Rotorcraft Flight Manual (RFM), operate this rotorcraft in accordance with the following operating limitations.

1. Certification. No person may operate this rotorcraft with an external load unless that person holds an FAA Rotorcraft External-Load Operating Certificate and has a letter of competency or an entry in his or her logbook, as required by Title 14 of the Code of Federal Regulations (14 CFR) part 133, § 133.37(a)(2). The letter of competency or the knowledge and skill test logbook endorsement must be in that person's possession while conducting operations under part 133.

Note: For Public Aircraft Operations (PAO), see paragraph 3.5, Public Aircraft Operations (PAO).

2. Persons Aboard. No person who is not a required crewmember may fly aboard the rotorcraft unless that person performs an essential function in connection with the external-load operation. When the rotorcraft used requires a hoist operator, the air crewmember must wear an approved hoist operator's safety harness while not seated with a seatbelt fastened.

3. Congested Area Operations. Do not conduct operations over congested areas unless approved by the FAA Flight Standards District Office (FSDO) in accordance with a congested area plan (CAP) developed in compliance with § 133.33(d)(1) and (2) (refer to AC 133-1, Figure 3-1, Sample Congested Area Plan).

4. Knowledge and Skills. No person may serve as a pilot of this rotorcraft during external-load operations unless that person has passed the knowledge and skill tests required by § 133.23 for the class of operation being conducted.

5. Required Documentation. A copy of the Rotorcraft External-Load Operating Certificate and Rotorcraft-Load Combination Flight Manual (RLCFM) will be on board this rotorcraft during all external-load operations.

6. Weight and Load Combination. The total weight of this rotorcraft and load combination may not exceed:

Make and model _____ N-number _____

Class A load max weight _____ # not to exceed maximum gross weight _____

Maximum forward airspeed _____ knots Other _____

Make and model _____ N-number _____

Class B load max weight _____ # not to exceed maximum gross weight _____

Maximum forward airspeed _____ knots Other _____

Exercise extreme caution when carrying Class B external loads because the size and shape of the cargo can affect controllability.

Make and model _____ N-number _____

Class C load max weight _____ # not to exceed maximum gross weight _____

Maximum forward airspeed _____ knots Other _____

7. Center of Gravity (CG). The location of the CG for this rotorcraft and load combination must be within the CG range established during type certification under 14 CFR part 27 or 29 or special purpose certification of the rotorcraft.

8. Other Limitations. Other limitations deemed necessary by the operator or contained in the RFM or the RFM Supplements (RFMS).

Section 2. Load-Combination Information

1. Information Specific to the Load Combination. The operator will list information pertaining to the peculiarities of the load combination, such as the following:

- Oscillating tendencies,
- Spinning loads and the appropriate use of swivels,
- Ground effect,
- Density altitude,
- Strong or gusty winds,
- Abrupt control movements,
- Acceleration limitation,
- Maximum Class A lateral load imbalance, and
- Lateral CG calculation procedure.

This is an example of information that may be applicable to some types of cargo attach devices:

“Lift the cargo load to a hover, then check the remaining power to determine if there is enough to carry the load safely. While hovering, verify that directional control is adequate. When moving into horizontal flight, use smooth, slow control movements to minimize settling and to prevent the load from swinging. In climbing forward flight, check for hazardous oscillations of the external load. When approaching a landing area with a load, identify the delivery point and come in slowly, into the wind, at the shallowest possible angle, ensuring that the load clears all obstructions safely. Start bringing in power early to slow your descent and forward airspeed, ending in a hover short of the release point and in view of any ground crew personnel. Follow ground signal instructions to hover over the release point. Place the load on the ground without any movement of the load. When the helicopter is stabilized over the load and has slack in the sling, open the cargo hook by normal means. In the event of electrical failure, use the manual release to drop the cargo load. If any difficulties arise during the flight that warrant an emergency landing, release the load immediately. If for some reason the load will not release, do not drag the load on the ground before touchdown. This may cause the rotorcraft to nose over with inadequate aft cyclic control to compensate.”

2. Required Inspections. Inspect the cargo sling or basket for proper installation and overall condition. Check the load to ensure proper and safe rigging. For Class B and C loads, check the electrical release and the manual release on the ground before flight. Arm the circuit by pushing the cargo release circuit breaker in.

3. Static Electricity Discharges. Before attaching the cargo hook to the load, make sure to ground the rotorcraft to dissipate charges of static electricity that may have built up during flight.

4. Other Information Essential to Operational Safety. The operator must set forth any other information essential for safe operation with external loads, such as:

1. Class B Human External Cargo (HEC) operations.
2. Class B HEC training:
 - Pilot training.
 - Crewmember training.
 - Recurrent training.
 - Recent experience.
3. Personnel qualifications:
 - Pilot qualifications.
 - Crewmember qualifications.
4. Class B HEC briefings.
5. Operational safety considerations.
6. Communications.
7. Precautions to avoid high-tension wires.
8. Lightning (Class C loads).
9. Radio communications procedures.
10. Crossing over main highways.
11. Procedures for the placement of cargo at delivery (may vary according to a specific operation class).
12. Night operation considerations, limitations, training, and risk mitigation procedures (if applicable).

Note: An example of the HEC essential information to be included in the RLCFM may be found in AC 133-1, paragraph 3.4. Additional information regarding night operations may be found in AC 133-1, paragraph 3.5.

5. Ground-to-Air Hand Signals. All personnel engaged in the external-load operation will be familiar with and use the hand signals found in AC 133-1, Appendix B. (List the procedures used to ensure familiarity.)

6. External-Load Securing Procedures. Use the company procedures to make precautionary landings in the event the securing devices become disconnected or loose.

7. Fuel Burnoff/Center of Gravity (CG). Fuel burnoff and how it may affect the CG en route.

8. Required Placards.

a. Place a placard for the maximum weight of external load on each side of the fuselage near the external-load hook or basket if a Class A load.

b. Install an instrument panel placard describing load class approval and passenger occupancy limitations.

9. Operating Procedures. After directing the helicopter into position, one ground crewmember should remain within sight of the pilot to give positive direction with hand signals, or remain in direct radio contact with the pilot, while an appropriate number of other crewmembers attend to the cargo hookup. Hasten all hookups made to the helicopter while it is in a hover to minimize the time the hookup personnel spend underneath the helicopter.

a. If performing a hookup without the aid of a ground guide and without using direct visual operational contact, an air crewmember should lie prone on the floor and look downward from the main entrance doorway to observe the actions of the ground crewmembers; this crewmember can direct the pilot via the intercom.

b. It is relatively common, however, for a pilot to hover while ground personnel hook the line to the cargo hook. Regardless of whether there are extra crewmembers to act as observers, a thorough briefing between the pilot and the hookup person is extremely important. The hookup person should approach and proceed beneath the helicopter directly from the front, between the skids or landing gear. Should the helicopter experience catastrophic failure and be forced to land, the hookup person should retreat directly to the front. This technique avoids the confusion of “you go right, and I will go left.”

c. Crewmembers should wear approved safety harnesses and be attached to an aircraft’s approved attachment point when not seated with seatbelts fastened.

d. When giving hand signals to the pilot, a ground crewmember must stand in front of and to the pilot’s side of the helicopter, within sight of the pilot. (Refer to AC 133-1, Appendix B for hand signals.)

10. Safety Precautions. Conduct all Class D operations using only FAA-approved personnel lifting devices. The crew must calculate one-engine-inoperative hover capability at the operating weight and altitude prior to each Class D operation. Conduct each operation with a minimum of two crewmembers onboard the helicopter. Maintain intercom communication between the pilot and other crewmember. This second crewmember must be able to advise the pilot of the status of the lift device and be able to release the empty device should it become necessary. This release must require two separate and distinct actions: arming the system and depressing the release button. Where possible, a third person associated with the lift will be in position on the surface and communicating by radio with the pilot. This person’s purpose is to advise the pilot of any safety-related item and to supervise the loading or unloading of the personnel lifting device. Further, this person should ensure not to exceed the pilot-determined maximum weight appropriate for this operation.

The operating limitations as set forth in Section 1 and the load combination information contained in Section 2 are the conditions under which I will conduct this rotorcraft external-load combination operation.

Operator's signature

Section 3. Information

All personnel associated with an external-load operation should be familiar with the following information.

1. General. Serious injuries and fatalities may occur if personnel are not trained on the proper method for approaching or leaving the rotorcraft. The simplest method of avoiding accidents of this sort is to have the rotors stopped when non-flightcrew personnel are working around the rotorcraft. Because this is not always practical, it is essential that all persons associated with helicopter operations be aware of all possible hazards and instructed in how to avoid them.

2. Flight and Non-Flightcrew Personnel. Instruct persons directly involved with boarding or deplaning personnel, rotorcraft servicing, rigging, or hooking up of external loads, etc., in their duties. Types of crew training related to the safe operation of helicopters include, but are not limited to, the following:

a. Ground Crew. Instruct ramp attendants and rotorcraft servicing personnel in safe means of accomplishing their specific duties. This includes:

(1) Keeping persons scheduled to board and unauthorized persons away from the helicopter landing and takeoff areas.

(2) Briefing boarding personnel on the best way to approach and board a helicopter whose rotors are turning.

b. Servicing. Proper procedures for rotorcraft servicing include the following:

(1) Stop the helicopter rotor blades and properly ground both the rotorcraft and the refueling unit before any refueling operation. The pilot should ensure the use of the proper fuel grade and any required additives.

(2) Refueling the rotorcraft while the blades are turning (hot refueling) may be practical for certain types of operations. However, this can be extremely hazardous when safe procedures are not followed. Pilots should remain at the flight controls during fueling; refueling personnel should be knowledgeable about proper refueling procedures and properly briefed for specific makes and models of rotorcraft. Refueling personnel must communicate with the pilot by radio or using hand signals during hot refueling.

(3) Position refueling units to ensure adequate rotor blade clearance; keep persons not involved with the refueling operation clear of the area. Verify disconnection and securing of all refueling equipment away from the rotorcraft prior to rotorcraft movement. Always ensure that proper fire extinguishing equipment is readily available when refueling.

(4) Prohibit smoking in and around the rotorcraft during all refueling operations.

c. Rigger Training. External-load rigger training is possibly one of the most difficult and continually changing aspects of the helicopter external-load operation. A poorly rigged cargo net, light standard, or load pallet could result in a serious accident. It is imperative that all riggers be thoroughly trained to meet the needs of each external-load operation. Since rigging requirements may vary several times in a single day, proper training is of the utmost importance to safe operations.

d. Pilot at the Flight Controls.

(1) Many helicopter operators have been lured into a “quick turnaround” ground operation to avoid delays and to minimize stop/start cycles of the engine. As part of this quick turnaround, the pilot will leave the cockpit with the engine and rotors turning. Such an operation can be extremely hazardous if a gust of wind disturbs the rotor disc, or if a flight control moves, causing the rotor system to generate lift. Either occurrence may cause the helicopter to roll or pitch, resulting in a rotor blade striking the tail boom or the ground. Safe operating procedures include pilots remaining at the flight controls whenever the engine is running and rotors are turning.

(2) An appropriately certificated and rated pilot should be at the flight controls during the entire hot fueling/loading process with controls appropriately adjusted to prevent aircraft movement. The pilot should unbuckle all restraints and be prepared to immediately shut down the engine and egress the aircraft, if necessary. The pilot should not conduct any extraneous duties during hot fueling/loading. Other personnel should not be on board the aircraft during hot fueling/loading.

(3) Hot fueling/loading can be extremely hazardous and is not recommended except when absolutely necessary due to the nature of the operation. Operators who conduct hot fueling/loading should develop standard operating procedures (SOP) for flightcrew and ground crew personnel.

e. External-Load Signalmen Should Know the Following:

(1) The lifting capability of the helicopters involved. This knowledge is essential because some operators have models of helicopters that have almost identical physical characteristics, but different lifting capabilities.

(2) The pilots. The safest plan involves standardized procedures for pickup and release of external loads. Without standardization, the hookup person is required to learn the technique used by each pilot. The hookup person should insist on standardization of pilot techniques for any sort of emergency that may occur while personnel are beneath the helicopter.

(3) The cargo. Many items carried externally are very fragile. The hookup person must be familiar with potentially hazardous materials (hazmat) and aware of the nature of the potential hazard. Explosives, radioactive materials, and toxic chemicals are examples of possible hazmat. (Title 49 of the Code of Federal Regulations (49 CFR) part 172, §§ 172.101 and 172.102 contain the hazmat commodity lists.) Carriage of hazmat in part 133 operations requires FAA authorization. In addition to knowing the nature of the cargo, hookup personnel should receive training to handle and be familiar with the types of protective gear, clothing, and actions that are necessary for safe operation.

(4) The appropriate hand signals. When direct radio communications between ground and flight personnel are required, clarify the specific meaning of all necessary hand signals before the operations commence.

(5) Emergency procedures. Ground and flight personnel should fully agree to and understand all necessary actions to take by all concerned in the event of emergency. This prior planning is essential in avoiding injuries when emergencies occur.

(6) All aspects of the external-load operation being conducted. The pilot conducting the external-load operation will complete a detailed briefing for all personnel, no matter how remotely involved in the operation, prior to starting the operation.

3. Safety Around Helicopters. Instruct all persons who board a helicopter while its rotors are turning in the safest means of doing so. If at the controls, the pilot may not be able to conduct a boarding briefing. Therefore, the individual who arranged for carriage of the personnel or the individual assigned as a ramp attendant should accomplish this. The exact procedures may vary slightly from one model helicopter to another, but in general, the following should suffice.

a. Boarding:

- (1) Stay away from the rear of the helicopter.
- (2) Crouch low before walking under the main rotor.
- (3) Approach from the side or front but never out of the pilot's line of vision, and only when the pilot or ground personnel in contact with the pilot indicate clearance.
- (4) Hold firmly to hats and loose articles.
- (5) Never reach up for or run after a blown-away hat or other object.
- (6) Protect your eyes by shielding them with your hand or by squinting.
- (7) If suddenly blinded by dust or a blowing object, stop, crouch lower or sit down, and await help.
- (8) Never grope or feel your way toward or away from a helicopter.

b. Briefing. The pilot or his or her designee must make the pretakeoff briefing. The type of operation will determine what sort of briefing is given, but the briefing should always include:

(1) The use and operation of seatbelts for takeoff, en route, and landing. Place emphasis on how to release the specific kind of seatbelt installed in the particular rotorcraft. Helicopters do not always use automotive type releases; for instance, some belts use buckles that rotate to open.

(2) The location and use of flotation gear and other survival equipment that might be onboard, and how and when to “abandon ship” if a ditching is necessary.

(3) For flights over rough or isolated terrain, tell all occupants where maps and survival gear are located.

(4) Instruct each person on board in what actions and precautions to take during an emergency, and how and when to exit after landing in the event of an emergency. Ensure that passengers are aware of the location of fire extinguishers, pyrotechnic signaling devices, life preservers, and other survival equipment. Explain the location and methods of opening normal and emergency exits. The FAA encourages use of a diagram or pictorial display on a passenger briefing card.

(5) Prohibit smoking within 50 feet of a rotorcraft.

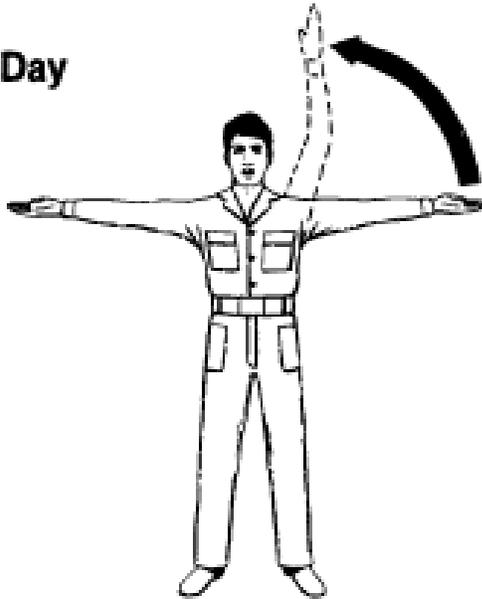
(6) The conditions of the landing determine what persons should hear in a departing briefing. For example, if on a hill, depart downhill. If this involves walking around the helicopter to avoid the area of lowest rotor clearance, always go around the front, never the rear. The operator may adapt the diagrams included in AC 91-32, Safety In and Around Helicopters, to include in a briefing card.

APPENDIX B. HAND SIGNALS

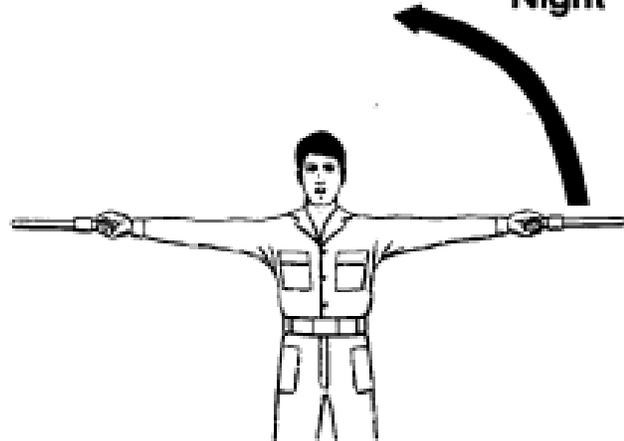
**Move to
Left:**

Right arm extended horizontally sideways in direction of movement and other arm swung in front of body in same direction, in a repeating movement.

Day



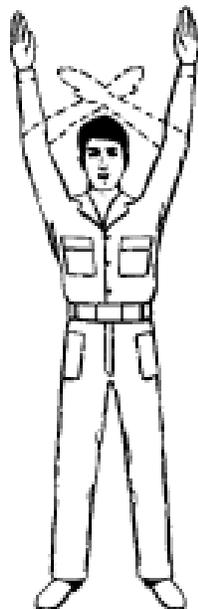
Night



Stop:

Arms held crossed overhead.

Day



Night



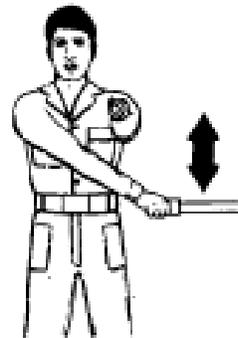
Release

External Load: *Left arm extended forward horizontally, fist clenched, right hand making horizontal slicing movement below the left fist, palm downward.*

Day



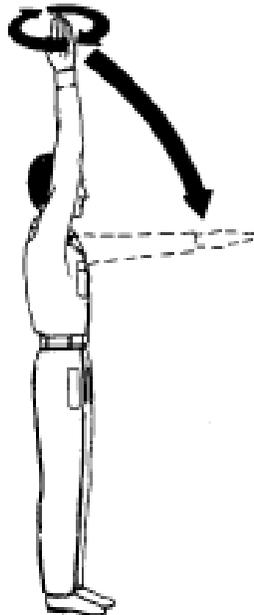
Night



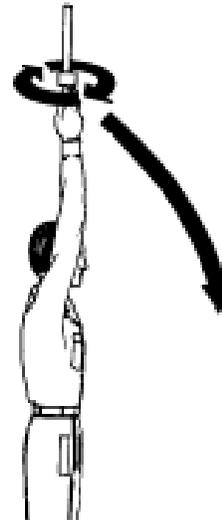
Takeoff:

The right hand is moved in a circular motion overhead, ending in a throwing motion in the direction of takeoff. Also means load clear, hookup good.

Day

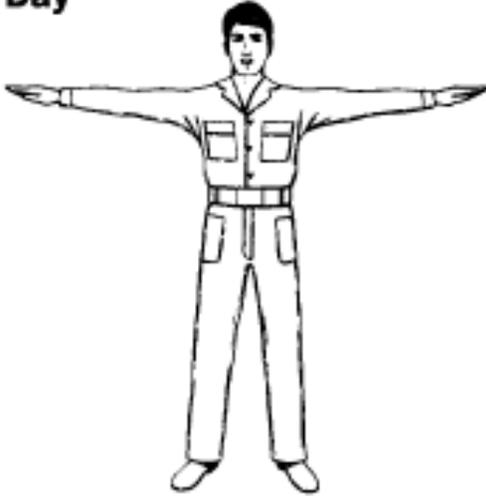


Night



Hover: *Arms extended horizontally sideways, palms downward.*

Day



Night



Move Forward: *Arms a little aside, palms facing backward and repeatedly moved upward-backward from shoulder height.*

Day



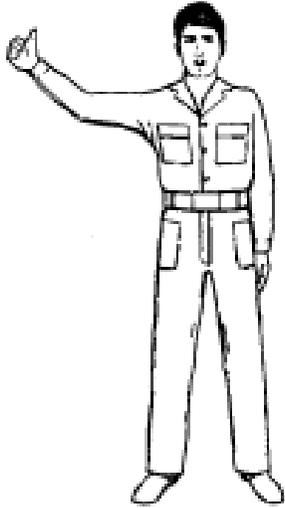
Night



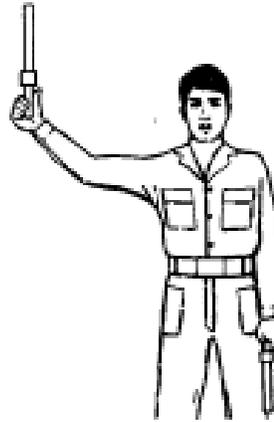
Affirmative

Signal: *Hand raised, thumb up.*

Day



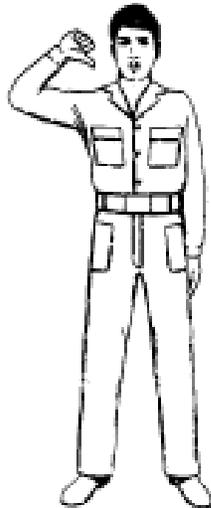
Night



Negative

Signal: *Hand raised, thumb down.*

Day



Night

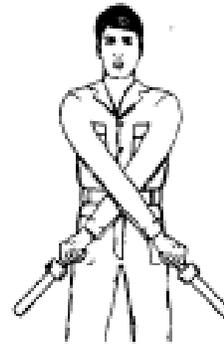


Land: *Arms crossed and extended downward in front of the body.*

Day



Night

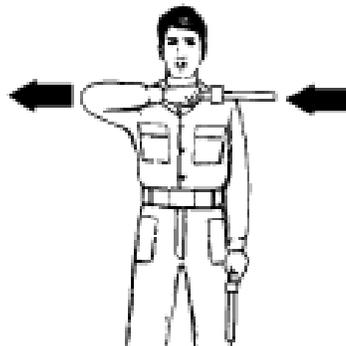


Cut
Engine(s): *Either arm and hand level with shoulder, hand moving across throat.*

Day



Night



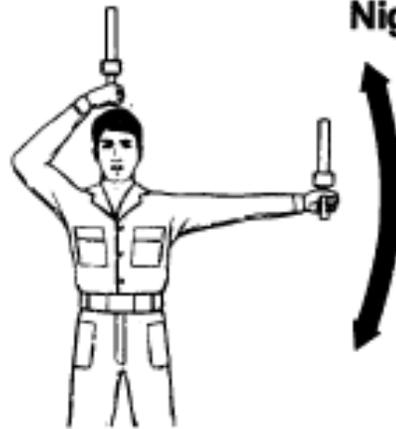
Move Hook Down or Up:

Right fist held above head: left arm extended horizontally, palm faced outward, then swept down or up to indicate direction of hook movement.

Day



Night



Hookup:

Hands raised alternately above the head in a "rope climbing" motion to take up slack.

Day



Night

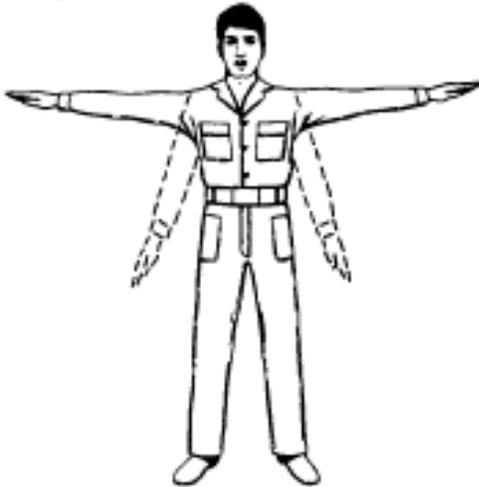


Move

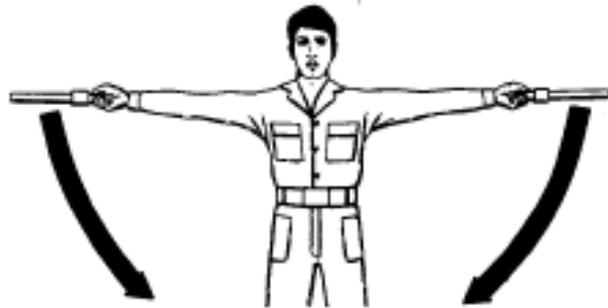
Downward:

Arms extended horizontally sideways, beckoning downward, with palms turned down.

Day



Night

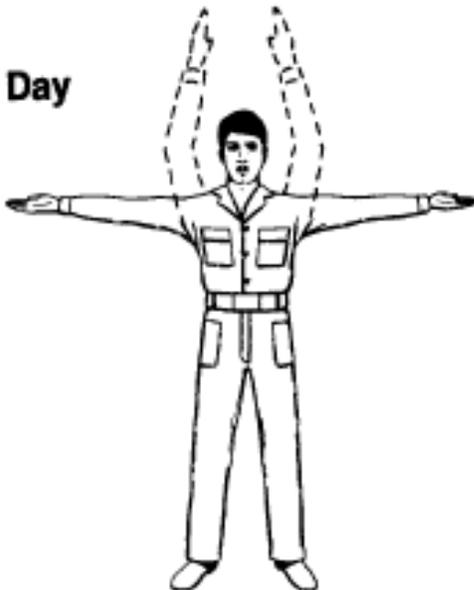


Move

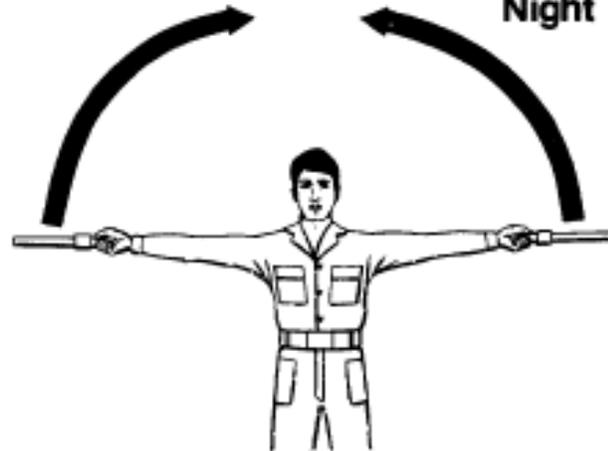
Upward:

Arms extended horizontally sideways, beckoning upward, with palms up.

Day



Night



**Move
Rearward:**

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

Day



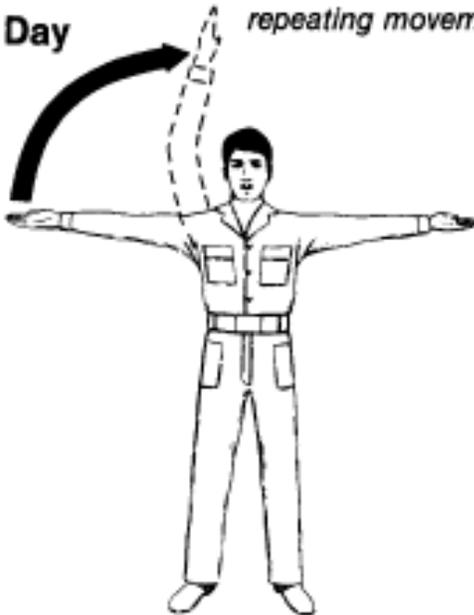
Night



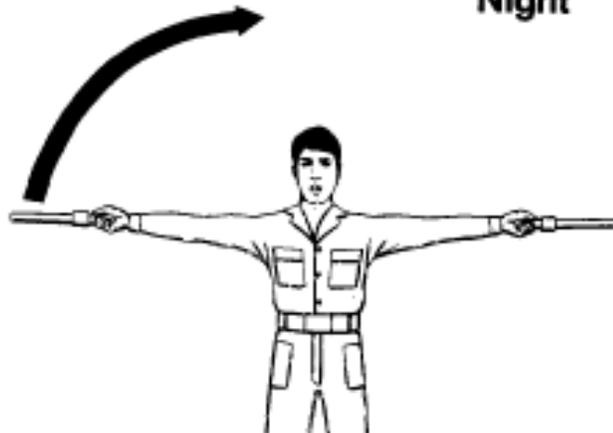
**Move to
Right:**

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

Day



Night

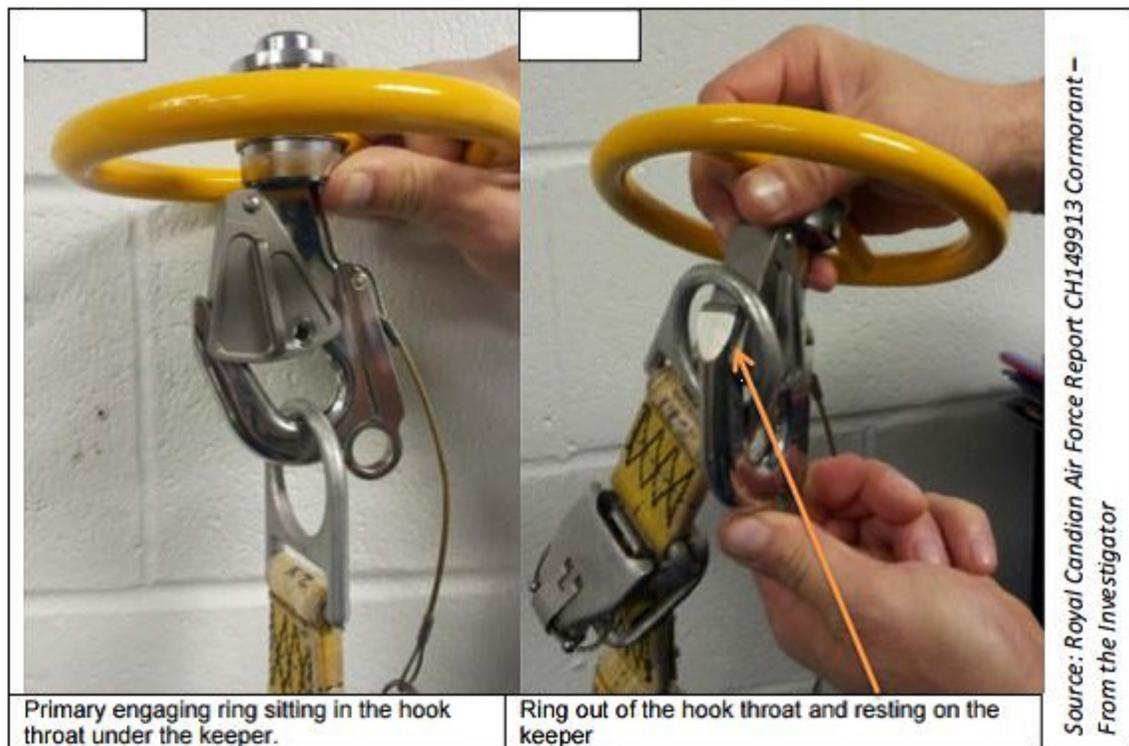


APPENDIX C. POSSIBILITY OF D-RING REVERSAL OR DYNAMIC ROLLOUT DURING WINCHING OR LONG LINE OPERATIONS

C.1 Background.

1. Unintended disconnection between the helicopter winch hook and the primary engaging ring on the occupant's rescue harness typically occurs during a pause in the winching sequence, when the ring in the rescue strop and the hook are temporarily relieved of the load. With no weight on the hook and ring, under the dynamic conditions of this type of operation, it becomes easy for the ring to travel up and flip over the tip of the hook and to rest on the spring-loaded keeper. The ring is now only supported by the spring-loaded keeper (see Figure C-1, Example of D-Ring Reversal).

Figure C-1. Example of D-Ring Reversal



2. When the winching sequence commences, the load is reapplied, and the ring opens the spring-loaded safety catch and slips off the hook and the occupant or load falls to the ground.
3. HEC rescue winch hooks with exposed hook tips, such as the MS 18027-2A, do not prevent D-ring reversal or deflect the primary engaging ring safely back into the throat of the hook (see Figure C-2, MS 18027-2A Hook).
4. HEC rescue winch hooks with manually locking keepers or guards have a hand-operated mechanical latch or keeper lock, in addition to spring pressure used to initially close the keeper. Such designs are intended to prevent partial

hook engagement and deflect the primary engaging ring safely back into the throat of the hook, thus preventing D-ring reversal (see Figures C-3, Hook with a Mechanical Lock Latch Gate Design, and C-4, Hook with a Simple Spring-Loaded Safety Latch or Keeper).

Figure C-2. MS 18027-2A Hook



Figure C-3. Hook with a Mechanical Lock Latch Gate Design

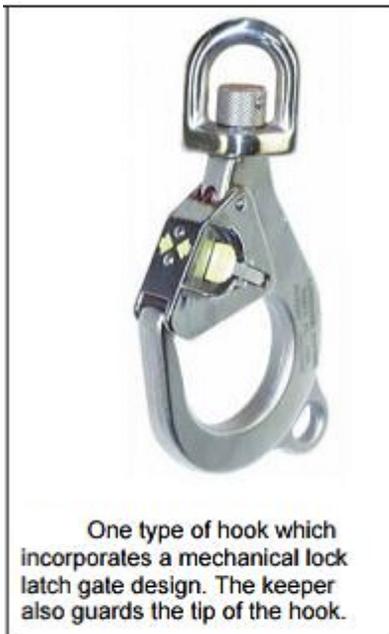


Figure C-4. Hook with a Simple Spring-Loaded Safety Latch or Keeper**C.2 Recommend Action.**

1. Develop procedures which list the specific D-rings or equipment which may be attached to a specific rescue hook wherein the possibility of D-ring reversal is physically impossible.
2. Use only rescue hooks which have a mechanical locking keeper or guards to prevent ring reversal or dynamic rollout.
3. Ensure winch operational training is tailored for each helicopter type and winch combination and is completed on a regular basis.
4. Operate and maintain winches, hooks, and harnesses in accordance with approved data.

Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by contacting the General Aviation and Commercial Division (AFS-800) at 9-AFS-800-Correspondence@faa.gov or the Flight Standards Directives Management Officer at 9-AWA-AFS-140-Directives@faa.gov.

Subject: AC 133-1B, Rotorcraft External-Load Operations

Date: _____

Please check all appropriate line items:

An error (procedural or typographical) has been noted in paragraph _____
on page _____.

Recommend paragraph _____ on page _____ be changed as follows:

In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

Other comments:

I would like to discuss the above. Please contact me.

Submitted by: _____

Date: _____