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# Advisory Circular

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**Subject:** Emergency Medical  
Services/Helicopter (EMS/H)

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1. **PURPOSE.** This Advisory Circular (AC) provides information and guidance material which may be used by Air Ambulance and Emergency Medical Service/Helicopter (EMS/H) operators. It must be emphasized that this AC diminishes neither the force nor the effect of the Federal Aviation Regulations (FAR). The regulations, of course, are always controlling. This document does not interpret the regulations; interpretations are issued only under established national Federal Aviation Administration (FAA) procedures.

2. **CANCELLATION.** AC 135-14, Emergency Medical Services/Helicopter, dated October 20, 1988.

3. **FOCUS.** These guidelines are applicable to EMS/H operations under FAR Part 135 and are recommended for EMS/H operations conducted by public service and other operators.

4. **RELATED FAR SECTIONS.** FAR Parts 1, 27, 29, 43, 61, 65, 91, 135, and 157.

5. **RELATED READING MATERIAL.** Additional information may be found in the following AC's (as revised) and other listed publications:

a. **FAA Documents:**

(1) AC 27-1, as revised, Certification of Normal Category Rotorcraft.

(2) AC 29-2, as revised, Certification of Transport Category Rotorcraft.

(3) AC 91-32, as revised, Safety In and Around Helicopters.

(4) AC 91-42, as revised, Hazards of Rotating Propeller and Helicopter Rotor Blades.

(5) AC 120-27A, as revised, Aircraft Weight and Balance Control.

(6) AC 120-49, Certification of Air Carriers.

(7) AC 135-5, as revised, Maintenance Program Approval for Carry-On Oxygen Equipment for Medical Purposes.

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(7) AC 135-5, as revised, Maintenance Program Approval for Carry-On Oxygen Equipment for Medical Purposes.

(8) AC 150/5390-2, Heliport Design.

**NOTE:** Copies of (1) through (8) may be obtained free of charge from the U.S. Department of Transportation, Distribution Requirements Section, M-443.2, Washington, DC 20590.

**b. Other Documents.**

(1) Pamphlet - DOT/FAA/PM-86/45, Aeronautical Decision Making for Helicopter Pilots. Copies may be purchased from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. Order number is ADA178050. Microfiche is available for purchase.

(2) Pamphlet - DOT/FAA/DS-88/7, Risk Management for Air Ambulance Helicopter Operators. Copies may be purchased from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

(3) Pamphlet - National EMS Pilots Association, Preparing a Landing Zone. Copies may be purchased from the National EMS Pilot Association, P.O. Box 2354, Pearland, Texas 77588.

(4) Helicopter Association International (HAI) publications - Safety Manual (revised 1990), Helicopter User's Guide (revised 1990), Aeronautical Guidelines (under revision), Fly Neighborly Guide, Heliport Development Guide, and HAI/AAMS EMS Recommended Guidelines. Copies may be purchased from HAI, 1619 Duke Street, Alexandria, VA. 22314. Telephone 703/683-4646.

(5) NFPA Publication 410-1980: Fire Protection/Aircraft. Copies may be obtained from: National Fire Protection Association (NFPA), Battery Park, Quincy, Massachusetts 02269.

(6) Air Ambulance Guidelines, DOT HS 806703 Revised May 1986, U.S. Department of Transportation, National Highway Traffic Safety Administration. Copies may be obtained from: U.S. Department of Transportation, Distribution Requirements Section, M-443.2, Washington, D.C. 20590.

**6. BACKGROUND.** The use of helicopters as swift transportation of wounded personnel from the battlefield to medical facilities for immediate care during the Korean and Vietnamese conflicts resulted in a substantial drop in the death rate of U.S. servicemen as compared to previous wars. This dramatic use of helicopters as a medical tool spread to the civil community. Today, helicopters are a vital tool within the medical field, providing a means of transporting critically injured people in urgent need of medical assistance. The EMS/H industry continues to expand. Each year thousands of patients are transported while being attended by medical teams trained to accommodate specific needs of the patients. EMS/H aircraft are equipped with the latest state-of-the-art medical monitoring and support systems to insure

proper care while en route. In response to the dynamic growth of this industry, the FAA has issued this AC providing information and guidelines that will further assist EMS/H operators in their operations. This AC provides guidance to operators conducting or planning EMS/H operations.

7. **DEFINITIONS.** This paragraph defines terms used for the purpose of this AC. Other definitions may be found in FAR Part 1, "Definitions and Abbreviations," and the "Pilot/Controller Glossary" supplement to the Airman's Information Manual.

a. **Aeromedical Director.** A licensed physician within an air ambulance service or EMS/H operation who is ultimately responsible for patient care during transport missions. The aeromedical director is responsible for assuring that appropriate aircraft, medical personnel and equipment are provided for each patient.

b. **Air Ambulance and/or EMS/H:** A helicopter designated for the transportation of ambulatory patients or other patients requiring special care including, but not limited to, basic life support (BLS) or advanced life support (ALS). An air ambulance or EMS/H is equipped with the medical equipment (portable or installed) necessary to support these levels of care in flight with trained medical personnel.

c. **Air Ambulance Service and/or Emergency Medical Service (EMS).** The use of an aircraft in transportation, for carriage of ambulatory or other patients requiring special care, including BLS or ALS, during flight, and/or transport of body organs for medical reasons. An air ambulance or EMS aircraft may be used to transport patients deemed by medical personnel to require other special service not available on regular commercial air carrier or charter flights.

**NOTE:** The service of providing transportation for body organs and no passengers can be considered a cargo operation.

d. **Certificate Holding District Office (CHDO).** The FAA Flight Standards District Office (FSDO) with responsibility for management of the air carrier's certificate and which is charged with the overall inspection and surveillance of the certificate holder's operations.

e. **Flightcrew Member.** A pilot, flight engineer, or flight navigator assigned to duty in an aircraft during flight time is considered a crewmember.

f. **Helicopter Hospital Emergency Medical Evacuation Services (HEMES).** The operation of a helicopter, based at a hospital, to transport patients in an emergency medical evacuation service only. This type of operation may operate under FAR Sections 135.267 or 135.271; however, the specific rule should be included in the appropriate operations specifications for that operator.

**g. Levels of Medical Care.**

(1) **BLS.** Refers to the air-medical provider offering airborne patient transports staffed by a minimum of one medical person who is experienced and qualified by training, certification, and current competency in BLS care. This medical person practices through the orders of a physician-medical director and is supported by a medically configured aircraft capable of providing BLS systems (such as oxygen, suction, electrical supply, lighting and climate control) to the patient. As used in this statement, BLS consists of a medical person capable of recognizing respiratory and cardiac arrest, starting and maintaining the proper medical procedures until the victim recovers, or the medical person stops procedures, or until ALS is available. In air-medical transports, BLS includes air-to-ground communications to ensure continuity of care. ("Standards for CPR and ECG," JAMA, February 18, 1974.)

(2) **ALS.** Refers to the air-medical provider offering airborne patient transports staffed by a minimum of two medical personnel who are experienced and qualified by training, certification, and current competency in emergency critical care. The medical personnel practice through the orders of a physician-medical director and are supported by a medically configured aircraft capable of providing life support systems (such as oxygen, suction, electrical supply, lighting, climate control, pressurization, etc.) to the patient. The following elements are recommended for ALS:

- (i) BLS.
- (ii) Using adjunctive equipment and special techniques, such as endotracheal intubation and closed chest cardiac compression.
- (iii) Cardiac monitoring for dysrhythmia recognition and treatment.
- (iv) Defibrillation.
- (v) Establishing and maintaining an intravenous infusion lifeline.
- (vi) Employing definitive therapy, including drug administration.
- (vii) Stabilization of patient's condition.

**NOTE:** ALS includes: (1) air-to-ground communications to ensure continuity of care, and (2) the capability of constant monitoring and life support until the patient has been delivered to a continuing care facility. ("Standards for CPR and ECG," JAMA, February 18, 1974.)

h. **Local Flying Area.** An area designated by the operator in which EMS operations will be conducted. The local flying area should be defined in such a manner that is acceptable to both the operator and the Principal Operations Inspector (POI) taking into account the operating environment and geographic terrain features.

i. **Medical Personnel.** A person trained in air-medical environment and assigned to perform medical duties during flight including, but not limited to, doctors, nurses, paramedics, respiratory therapists or emergency medical technicians. Medical personnel may also be trained and assigned to perform other duties by the certificate holder.

j. **Patient.** A person under medical treatment.

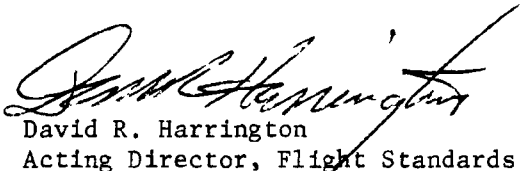
k. **Principal Avionics Inspector (PAI).** An FAA inspector assigned by the FAA Administrator to oversee the avionics functions of the certificate holder.

l. **Principal Maintenance Inspector (PMI).** An FAA inspector assigned by the FAA Administrator to oversee the maintenance functions of the certificate holder.

m. **POI.** An FAA inspector assigned by the FAA Administrator to oversee the operations functions of the certificate holder.

n. **Public Aircraft.** An aircraft used only in the service of a government or political subdivision. It does not include any government-owned aircraft engaged in carrying persons or property for commercial purposes.

**NOTE:** Public Law 100-223, December 30, 1987, Section 207, Public Aircraft Defined. Section 101(36) has been amended thus: "For the purposes of this paragraph, 'used exclusively in the service of' means, for other than the Federal Government, an aircraft which is owned or operated by a government entity for other than commercial purposes or which is exclusively leased by such government entity for not less than 90 continuous days."



David R. Harrington  
Acting Director, Flight Standards Service

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## CHAPTER 1. CERTIFICATION

1. **GENERAL.** Aircraft operators desiring to commence Air Ambulance or EMS/H operations as a FAR Part 135 air carrier who do not hold a FAR Part 135 air carrier certificate should refer to AC 120-49, Certification of Air Carriers, dated November 23, 1988, for methods and procedures to follow in the certification process. The FSDO located in the area where applicant desires to locate its principal business office will assist the applicant in becoming certificated. This chapter refers to added steps that may be required to obtain a FAR Part 135 certificate for EMS/H operations.

**NOTE:** For those operators presently conducting operations under FAR Part 135, new or revised operations specifications may be required prior to initiating EMS/H operations.

a. **Inspections.** Inspections will be conducted at the principal base of operations, and will include items such as:

(1) Maintenance facilities, equipment and records (including installation of special/medical equipment), lease agreements, and contract maintenance records.

**NOTE:** Lease agreements are considered proprietary documents and will be treated accordingly by FAA personnel.

(2) Manuals to ensure they contain information required by FAR Section 135.23.

(3) Recordkeeping system.

(4) Aircraft to be used in air transportation service.

(5) Each certificate holder is responsible for the airworthiness of its aircraft (FAR Section 135.413). Operator and/or contract maintenance facilities may be inspected for compliance with appropriate FAR. This particular inspection will be accomplished to determine the adequacy of tools, spare parts, special tools, and that properly trained personnel are available.

b. **Additional Equipment/General.** The applicant should identify, in their initial application, any specialized equipment that may be used in EMS operations. The equipment should be installed in the aircraft in an acceptable manner (using data approved by the aircraft manufacturer, an EMS equipment manufacturer, or the FAA Administrator). The FAA may approve add-on equipment installation after evidence of airborne test results are submitted from the aircraft operator, the Department of Transportation (DOT), Department of Defense, or an independent testing organization. Any equipment installed aboard the aircraft should comply with the data in AC 43.13-2A,

Acceptable Methods, Techniques, and Practices - Aircraft Alterations, Chapter 1, paragraph 2(d) and 3, and Chapter 12, paragraph 243(a), and withstand the following static loads in accordance with AC 43.13-1A, Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair:

- (1) 9.0G forward, 6.6G downward, 3.0G upward, and 1.5G sideward; and
- (2) tie-down, 13.5G forward, 9.9G downward, 4.5G upward, and 2.25G sideward.

(3) **Supplemental Type Certificate (STC) or Field Approval.** All items of additional equipment must be installed in accordance with the applicable FAR. The installation of additional equipment may require a STC or field approval by an airworthiness aviation safety inspector. It should be noted that the requirements for field approval are the same as for a STC. If the certificate holder is unsure of the requirements on the proposed equipment, they should contact the PMI before installation is initiated.

(4) **Maintenance Test Flight.** Certificate holder should ensure that the installation of all additional equipment is compatible with all previously installed aircraft systems. Aircraft navigation and communication equipment may have to be recalibrated after installation of any additional medical equipment. Before returning the aircraft to service after the installation of additional equipment, flight tests may have to be accomplished to determine if there is radio frequency/ electromagnetic interference (RFI/EMI) with any navigation, communication, or flight control systems. The flight tests should be accomplished in visual meteorological conditions. Tests should include all installed equipment as well as items of carry-on medical equipment intended to be used for patient transport. Results of the flight tests verifying acceptability should be entered into appropriate permanent records of the aircraft.

**NOTE:** Medical monitors may also be affected by the aircraft's electronic equipment; therefore, the medical monitors should be checked for accuracy by medical personnel before use with a patient.

**c. Equipment Recommended for EMS/H Operations:**

(1) **Aircraft Approved Searchlight.** A searchlight to be manipulated by the pilot, having a minimum movement of 90 degree vertical and 180 degree horizontal and capable of illuminating a landing site. The pilot should not have to remove his/her hands from the aircraft flight controls in order to operate the searchlight.

(2) **Radio Capable of Air-To-Ground Communications.** To ensure safe and satisfactory completion of transportation and to coordinate with emergency personnel on the scene (i.e., local or state police, fire department, etc.).

(3) **Restraining Devices.** To prevent patients from interfering with the flightcrew or the helicopter flight controls.



**NOTE:** Child restraint seats provided must meet DOT/FAA restraint and securing criteria.

(4) **Intercommunications System (ICS)**. An ICS should be provided for flightcrew and medical personnel to communicate with each other aboard the helicopter.

(5) **Wire Strike Protection System**. If type certificated for installation.

(6) **Stretchers (Litters)**. Stretchers must be in compliance with FAR Sections 27.561 and 29.785. Restraining devices, including shoulder harnesses, must be available to ensure patient safety.

**NOTE:** Patient life support systems which include litters/stretchers, berths, incubators, heart pumps, etc., not normally included in the type design of the aircraft, must also be installed in accordance with the applicable FAR and FAA approved data.

d. **Additional Equipment for EMS:** The following additional items of equipment are recommended for EMS operations:

(1) **Medical Oxygen System**. A medical oxygen system including bottles, lines, gauges, regulators, and other system components which has been installed by approved data on an aircraft becomes an "appliance". If a single servicing port is installed in accordance with AC 27-1, as revised, Certification of Normal Category Rotorcraft, or AC 29-2A, as revised, Certification of Transport Category Rotorcraft, the system may be serviced by any person trained by the certificate holder. An oxygen bottle installed in a rack in the cabin area having its own regulator, hose and mask feeding directly to the patient may be removed and serviced by any person trained by the certificate holder. If servicing is accomplished by removing and replacing bottles or by disconnecting lines, regardless of the type fitting, it must be accomplished by an appropriately certified mechanic or repairman.

(2) **Supplemental Lighting System**. Some aircraft may require additional lighting since standard aircraft lighting may not be sufficient for adequate patient care. An emergency lighting system with a self-contained battery pack may be incorporated to allow for continued patient care and for emergency egress from the aircraft in the event of a primary electrical failure. A means to shield the cockpit from light in the patient area should be provided for night operations.

(3) **EMS Electrical Power Installation**. All wiring, electrical components and installation procedures must conform to the requirements of FAR Parts 27 or 29. An electrical load analysis must be performed to preclude an overload on the aircraft generating system. The system should be designed to provide the pilot a fast means of shedding electrical load in an emergency situation.

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(4) **Motor-Driven Vacuum/Air Pump.** Motors and/or pumps must be installed in accordance with FAR Parts 27 and 29. Any motor-driven device should be installed in such a way as to preclude contact with any flammable fluid, gas, or foreign materials that may cause heat buildup and possibly fire. Aircraft should be flight-tested with electrical motors running to check for RFI/EMI interference.

(5) **Defibrillator.** Extreme care should be taken when using a defibrillator on an aircraft. A suitable means of isolating the patient from the airframe must be incorporated to prevent inadvertent electrical shock to the flightcrew and other passengers. Defibrillator must be ground tested for proper operation before use in flight.

(6) **Incubators.** Incubators, balloon pumps, or other large carry-on medical equipment must be restrained in an appropriate manner to the following ultimate load factors:

(i) 3.0G upward, 6.6G downward; and

(ii) 9.0G forward, 1.5G sideward.

**NOTE:** If the equipment manufacturer does not provide pull test data to confirm that specific equipment can withstand the above loads, the certificate holder must demonstrate the above loads on each specific piece of equipment, or use an approved restraining device. Aircraft cargo straps or safety belts provide a satisfactory restraint in many instances. Also, mechanical (metallic) fasteners may be used for attachment.

**NOTE:** The incubator lid latches should withstand appropriate loads (approximately 15 pounds and any significant lid load). The operator should ensure the unit has minimum movement when secured if straps or belts are used. If the incubator includes features requiring electrical power, operation should be evaluated to assure there is no interference with aircraft instruments and equipment that are required by the FAA airworthiness certificate. The operator should provide padding for the infant for forward and downward loads and movement. Mattresses and all padding used should be in accordance with AC 25.853-1, Flammability Requirements for Aircraft Seat Cushions, dated September 17, 1986, and FAR Sections 27.853 or 29.853.

**e. Additional Equipment Installation.** Some equipment is installed in the aircraft for the purpose of patient care only. This equipment should be installed, using approved data, in racks that meet the g-loading requirements of an emergency landing. The racks should be removed and replaced by a certified FAA mechanic, but the medical equipment in the racks used for patient care should be installed so that it may be removed readily to accompany the patient. Instructions for removal and replacement should be contained in the operator's manual required by FAR Part 135.

(1) The certificate holder must ensure that the installation of all additional equipment is compatible with the aircraft systems. FAR Section 135.91(a)(1)(iv) requires that all installed equipment, including portable devices, be appropriately secured. The structure supporting the equipment must be designed to restrain all loads (up to the ultimate inertia specified in the emergency provisions/emergency landing conditions) required by FAR Parts 27 and 29. Equipment installed aboard the aircraft should meet the static and dynamic loads specified in AC 27-1 and AC 29-2, as revised.

(2) The installation of additional equipment by a STC or field approval. Normally the STC should provide instructions and operational supplements, weight and balance data, and instructions for continued airworthiness.

(3) Each installation must be evaluated at the time of its approval. This is to determine if a mechanic is required to perform installation or if other personnel can be trained for removal or replacement of these items. Frequent removal and replacement may constitute maintenance and require a certificated mechanic.

(4) If the installation does not require tools and can be done in accordance with approved data and procedures in the operator's manual, any person trained by the certificate holder may be authorized to install the equipment.

## 2. RECORDS

a. Maintenance Records. Each certificate holder must comply with the maintenance recording requirements of FAR Sections 135.439 and/or 91.417. When aircraft are sold, the certificate holder must comply with FAR Sections 135.441 and/or 91.419, Transfer of Maintenance Records.

b. Flight Records. Records required by FAR Section 135.63 must be kept at the certificate holder's principal business office, or at other operational locations approved by the Administrator. The following records should also be maintained at operational bases located at other than the principal business office:

(1) Flight crewmember's flight time and rest records. The flight time and rest records must contain information to show compliance with the flight, duty, and rest requirements of FAR Part 135, Subpart F. (Appendix 1 contains a sample flight and duty time record). The records should indicate whether operations are being conducted in accordance with FAR Sections 135.267 or 135.271.

(2) A copy of the most recent competency and/or proficiency flight check. For each pilot assigned to that particular location, a copy of the current flight/proficiency check should be available.

(3) Current airworthiness documentation. In order for the pilot to determine the acceptability of the helicopter prior to each flight, airworthiness documentation must be available.

(4) Flight following records. Flight following records of each flight will be maintained for a minimum of 30 days in accordance with FAR Part 135.

**3. OPERATIONS SPECIFICATIONS.**

**a. Additional Requirements.** FAR Part 135 certificate holders may use EMS procedures authorized with appropriate operations specifications. The operations specifications may contain conditional authorizations that apply to individual operators. The approving authority for the operations specifications will be either the POI, PMI, or PAI of the FAA CHDO having jurisdiction over the certificate holder. The operations specifications include the following items:

**NOTE:** If a FAR Part 135 operator does not provide full EMS/H services requiring medical personnel or special medical equipment but only occasionally transports body organs, that operator may not be required to comply with all provisions of the EMS/H automated operations specifications.

(1) Bases of operation. Location of all bases of operation where EMS/H activities will be performed.

(2) Exemptions. As appropriate.

(3) Deviations. As appropriate.

(4) Area of Operation. The area of operation (local and cross-country) for an EMS/H certificate holder will be identified on the operations specifications issued by CHDO.

(5) Special authorizations.

**b. Automated Maintenance Operations Specifications.** Operations specifications are indicated in AC 120-49. However, in addition the following are items that should be considered:

(1) Special/medical and navigation/communication equipment, if appropriate to the operations being conducted

(2) If the helicopter is being maintained under an Approved Aircraft Inspection Program, the operations specifications must include the make, model, and registration number of the helicopter on that program.

**c. Weight and Balance.** A weight and balance program using average weights for crewmembers, medical personnel, and patients should be developed regardless of the size of the helicopter used. This approved program will be listed in the certificate holder's operations specifications. (See appendix 2.)

**4. FACILITIES.** The facilities include the business office required by FAR Section 135.27, maintenance area, and operational area. Items to be checked during FAA inspections should include the manual as required by FAR Section 135.21, as well as the operator's use of business names, aircraft, advertising, area of operations.

**a. Maintenance.** Maintenance facilities should be large enough to house the largest type of helicopter used by the certificate holder, adequately lighted, and equipped to perform required maintenance. Additional specialized equipment may be required for the EMS equipment installed in the aircraft. Contract maintenance will be performed in accordance with the procedures outlined in the operator's manual.

**b. Operations.** The operations facilities should have an area for flight planning, scheduling, flight following, training, and recordkeeping.

**c. Flightcrew Place of Rest.** In accordance with FAR Section 135.271, an adequate place of rest will be provided for flight crewmembers assigned EMS/H duty at or in close proximity to the hospital at which the HEMES assignment is being performed. The place of rest should be in an area away from the general flow of vehicle and pedestrian traffic allowing a quiet, restful atmosphere. The place of rest should provide adequate facilities including but not limited to, a shower, a closet, a bed with sheets, and the space environmentally controlled for comfort. The place of rest should be available on a continuous basis for flight crewmembers.

**d. EMS/H and HEMES Heliports.** FAR Part 135 EMS/H heliports, other than medical emergency sites, should meet the criteria established in AC 150/5390-2, Heliport Design. This heliport criteria has been established to ensure the highest level of safety for established heliports.

**5. MANUAL.** It is recommended each certificate holder conducting EMS/H operations should prepare a manual for such operations. The manual should be available in each helicopter and at each dispatch location. The following items are suggested for inclusion in the operations manual as well as items identified in FAR Section 135.23:

**NOTE:** This list does not relieve a certificate holder from including other items in their operations manual as required by FAR Part 135.

**a.** Names of all EMS/H management personnel that have authority to act for the certificate holder. The aeromedical director will not exercise control over EMS air ambulance missions unless he/she is listed in the manual required by FAR Section 135.21 as a person authorized by the certificate holder in accordance with FAR Section 135.77.

**b.** The front page of the certificate holder's appropriate operations and maintenance operations specifications.

**c.** Accident and incident notification procedures to include the local FAA, National Transportation Safety Board, and FAA CHDO telephone numbers.

d. Refueling procedures with the engine(s) running (hot refueling) or shutdown.

**NOTE:** Refueling with the engine(s) running, rotor turning, and/or passengers on board is not recommended. However, situations of this type can arise during an EMS/H operation. Specific and rigid procedures should be developed by the operator in accordance with the POI to handle these occurrences. (See ACOB 9-90-1.) Such "hot refueling" procedures will be covered in the operator's training program.

e. Type of medical oxygen system installed including bottles, lines, gauges, regulators, other system components, and the approved method of servicing.

f. Instructions for the removal and replacement of equipment installed for the purpose of patient care only. This equipment should be installed in racks by approved data that meet the g-loading requirements in an emergency. The racks that hold the equipment should be removed and replaced by a certificated FAA mechanic, but the medical equipment used in patient care should be installed for easy removal by medical personnel if it is needed to go with the patient and the medical personnel should be trained accordingly.

**NOTE:** Patient life support systems which are not normally included in the type design of the aircraft, such as stretchers/litters, berths, incubators, heart pumps, etc., must be installed in accordance with approved data. This approved data normally include installation and removal instructions and should contain operational supplements, weight and balance data, and instructions for continued airworthiness.

Removal and replacement of these items may be repeated on a frequent basis and may or may not constitute maintenance. Each installation must be evaluated at the time of its approval to determine who is authorized to complete the installation. If the installation is simple, does not require tools, and can be done in accordance with approved data and procedures contained in the operator's manual, any person trained by the certificate holder may be authorized to install such equipment.

FAR Section 135.91(a)(1)(iv) requires that all equipment installed, including portable devices, must be appropriately secured. The supporting structure to which the equipment is to be attached must be designed to restrain all loads up to the ultimate inertia specified in the emergency provisions/emergency landing conditions required by the FAR.

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g. Flight release and flight following procedures.

h. In-flight emergency and emergency evacuation duties for EMS/H crewmembers and medical personnel.

**NOTE:** Items listed in (a) through (h) above do not preclude a certificate holder from including other items in the operator's manual required by FAR Part 135.

**CHAPTER 2. TRAINING PROGRAM**

**6. GENERAL.** This chapter outlines recommended training for all EMS personnel including flight crewmembers and medical personnel.

**a. Flight Crewmember.** The unusual requirements of the EMS/H mission means that aircraft may be dispatched in less than ideal weather conditions; i.e., night, low ceiling and/or low visibility, and into remote areas. Because of these adverse conditions, the pilot should be trained in the basic instrument flying skills to recover from inadvertent Instrument Meteorological Conditions (IMC).

**NOTE:** This training does not authorize or condone operating an aircraft in IMC without proper Air Traffic Control (ATC) clearance. Its purpose is to provide pilots with an additional margin of safety when conducting life saving missions. An operator's training program should include night operations into similar or like conditions that are normally encountered in EMS operations.

**b. Medical Personnel.** Medical personnel assigned duty during flight should be trained in the use of aviation terminology. Medical personnel should use aviation terminology to avoid confusion or misunderstandings of instruction from the flightcrew during the EMS mission.

(1) Medical personnel should be trained to properly use, remove, replace, and store medical equipment installed on the aircraft.

(2) Medical personnel should also be trained in physiological aspects of flight prior to being assigned flight duty.

(3) Medical personnel should be trained in aircraft evacuation and patient loading and unloading.

**NOTE:** The training program should consider the particular aircraft being used, and its safety features. A practice evacuation using emergency exits should be accomplished.

**NOTE:** If the certificate holder desires to use medical personnel to help advise the pilot of wires, obstructions, and other traffic during takeoffs and landings at EMS/H sites, those duties should be assigned by the certificate holder. Personnel assigned those duties should receive appropriate formal training.

**c. Ground crew and other ground personnel (i.e., nurses, paramedics, etc.).** EMS operations require stringent safety around the aircraft especially during arrivals, departures, loading, and unloading. The FAA



recommends that each certificate holder and hospital develop a training program that encompasses, in addition to their normal training program, the following:

(1) Personal safety in and around the helicopter for all ground personnel, including FAA rules and regulations and safety measures for each aircraft used.

(2) Loading and unloading the helicopter with the rotors and/or engine running.

(3) Loading and unloading with the helicopter shut down.

(4) Use of visual cues for positioning and parking the helicopter (i.e., standard hand signals, communications, etc.).

(5) A program coordinated with local authorities (i.e., fire and police departments) to deal with fuel leaks on the heliport, helicopter fires, and other situations requiring emergency responses.

(6) In-flight emergency and emergency landing procedures (securing equipment, body position, etc.).

(7) Aircraft evacuation procedures.

(8) Fire suppression (ground and in-flight).

(9) Procedures for day/night operations into and out of an unprepared landing site for the recovery of a patient.

(10) The safe handling of oxygen equipment by all involved personnel. All personnel authorized to refill oxygen should be trained in the use of the recommended cascade system. If liquid oxygen (LOX) is used, the specific nature of LOX should be addressed.

**NOTE:** The FAA recommends that this program involve a licensed airframe and power plant mechanic to teach the correct procedures for handling oxygen equipment.

**d. Maintenance Personnel.** In addition to meeting the requirements of FAR Part 65, Certification: Airmen Other Than Flight Crewmembers, maintenance personnel should be trained by the manufacturers of aircraft modification equipment, or in other maintenance training programs approved by the Administrator.

(1) **Inspection of installation**, as well as the removal and reinstallation of special medical equipment, should be a part of this training.

(2) **Supplemental Training.** Training on servicing and maintenance of medical oxygen systems, along with characteristics of medical oxygen versus aviator breathing oxygen, should be included in the training program.

**NOTE:** Recurrent training is recommended for all maintenance personnel.

e. **Cockpit Resource Management (CRM).** Regardless of the type of operations conducted (Instrument Flight Rules (IFR) or Visual Flight Rules (VFR), a training program should be established for CRM and the use of checklists. CRM procedures should include the utilization of all flightcrew resources, including medical personnel assigned duties, for all operations, including emergencies. Pilots should be trained in "challenge and response" method of checklist usage. First officers, when assigned, should be trained to assist the pilot as directed. When two pilots are assigned to a particular EMS transport, cockpit procedures should be developed for emergency situations where one pilot is designated to fly the aircraft while the second pilot tends to the emergency.

f. **Judgement and Decisions.** The decisionmaking process should have input from all elements involved in an EMS operation. Aeromedical directors, helicopter operators, flightcrew, medical personnel, and ground crew contribute to this process. The degree of input from each of these elements will depend upon the type and complexity of each mission.

(1) Management personnel, including the aeromedical director, should be familiar with appropriate FAR and FAA guidelines related to safe operations. Management personnel should participate in the certificate holder's training program to gain knowledge concerning EMS/H operations.

(2) An essential element in flight operations is the timely decision to conduct a particular flight or continue a flight as planned. To reach this decision, each participant in the decisionmaking process must be familiar with helicopter operations pertaining to the mission being planned.

(3) All personnel assigned to EMS/H should be trained in the operational aspects of each type of helicopter being used. Training should include, but is not limited to, the range of each helicopter versus number of crewmembers/passengers carried, equipment installed versus carry-on equipment, weather capabilities, safety around helicopters, and safety in landing areas.

(4) The certificate holder should be thoroughly familiar with the operational characteristics of each helicopter and the qualifications of each flight crewmember.

(5) Pilot judgement may be defined as: The mental process by which the pilot recognizes, analyzes, and evaluates information regarding himself/herself, the aircraft, and the external environment. Good pilot judgement can be developed as part of a flightcrew training program. Pamphlet DOT/FAA/PM-86-45, Aeronautical Decision Making for Helicopter Pilots, is recommended to improve aeronautical decisionmaking. The pamphlet covers the concepts of judgement and decisionmaking and is designed to be reviewed under the supervision of a flight instructor.

(6) A decision whether or not to conduct a flight, or to continue a flight as planned, is required by regulation to be made by the pilot in command. This decision should be based on the information received from other elements involved and on his/her judgment as an experienced pilot. The decision should not be based solely on the condition of the patient.

(7) The final step is the decision to conduct the flight in a safe and timely manner.

### CHAPTER 3. OPERATIONS

7. **GENERAL.** This chapter outlines recommendations regarding the conduct of FAR Part 135 EMS operations with helicopters.

a. **EMS/H Flight Following.** In order to ensure a safe, orderly execution of an EMS/H mission, each operating site should have a flight following system. Several factors including the potential 24-hour demands of EMS/H missions, surrounding terrain, and variable weather conditions, affect the safety of EMS flight operations. The following is provided to help ensure safe mission accomplishment:

(1) The certificate holder should have flight following procedures to include the notification of the communications center of specific aircraft departure times and estimated time of arrival.

(2) Flight following and/or communications should be maintained with the helicopter during each mission. These intervals should not exceed 15 minutes in flight and 45 minutes while on the ground.

(3) A communications system is established to ensure that medical personnel and crewmembers can communicate with the hospital and ground personnel at the patient transport site.

(4) A qualified, trained individual is designated as a communications specialist to receive and coordinate flight requests for EMS/H operations.

(5) An intercommunications system is available for communications between medical personnel and the flightcrew.

b. **Weather Minimums.** Each EMS/H flight following location should establish a local flying area and a cross-country flying area. VFR weather minimums should be specified for day and night local, and day and night cross country. VFR minimums should be no less than in table 1 which follows.

**Table 1. Uncontrolled Airspace**

CONDITIONS	CEILING	VISIBILITY
Day local	500 ft	1 mile
Day cross country	1000 ft	1 mile
Night local	800 ft	2 mile
Night cross country	1000 ft	3 mile

**NOTE:** For operations in controlled airspace, refer to FAR Sections 91.155 and 91.157.

(1) Each EMS/H certificate holder should develop a system of obtaining weather information prior to releasing any flight.

**c. Landing Sites.**

(1) Criteria should be established to ensure each airport/approved helicopter landing site has been evaluated by qualified personnel and the heliport or landing site meets the guidance contained in AC 150/5390-2, Heliport Design. The site evaluation should include the following:

- (i) Identification and/or removal of obstructions.
- (ii) Assessment of area lighting.
- (iii) Notation of helicopter ingress/egress limitations.

(2) A system should be established to familiarize pilots with all heliports serviced by the hospital/certificate holder. A method considered acceptable would be photographs, drawings, and other descriptive means to identify the helistop or heliport and any obstructions.

**d. Flight Controls.** The flight controls of a helicopter should not be left unattended by crewmembers while the rotor is turning.

e. **Flight Time and Rest Requirements.** Each operator will maintain a record that distinctly shows the difference of flight time, rest time, and off-duty or unassigned time, in accordance with FAR Part 135. It should be noted that in addition to FAR Section 135.263, there are two basic flight and duty time FAR sections applicable to EMS operations.

(1) FAR Section 135.267, Flight time limitations and rest requirements: Unscheduled one-and two-pilot crews, allows the flight crewmember to conduct any flight or other duties as assigned such as training, testing, routine transport missions, etc., while on duty/assignment. For an assignment conducted under this section, flight crewmembers must receive rest in accordance with FAR Section 135.267 (at least 10 consecutive hours of rest during the 24-hour period that precedes the planned completion of the assignment).

**NOTE:** FAR Sections 135.267 or 135.271 should be identified in the company training program and operations specifications and specify which FAR the operator has chosen to comply with for his/her particular operation.

(2) The rest requirements for HEMES under FAR Section 135.271 differ from the requirements of flights conducted under FAR Section 135.267. During operations in accordance with FAR Section 135.271, provisions must be made for 8 consecutive hours of rest during any 24 consecutive hour period. If the flight crewmember does not receive the required rest period, that pilot must be relieved of the assignment. The certificate holder should establish a recordkeeping mechanism to show that only bona fide emergency flights are conducted during these FAR Section 135.271 assignments. While a flight crewmember is assigned to HEMES under FAR Section 135.271, he/she may not be assigned to any other duties.

(3) For programs providing 24-hour consecutive EMS/H coverage, it is recommended that no less than four pilots per aircraft be assigned. EMS/H programs with high activity levels or those with unusual circumstances may require higher pilot-to-aircraft ratio. Sufficient staffing levels should be established to promote operational safety standards.

(4) Each certificate holder should provide relief for each person performing maintenance from duty for a period of at least 24 consecutive hours during any 7 consecutive days, or the equivalent thereof, within any 1 calendar month. The requirement of the certificate holder should be the same for contractor/vendor maintenance.

f. **Weight and Balance.** Each operator should develop a control system for weight and balance that shows the aircraft will be properly loaded and will not exceed limitations during flight. A control system may include the following:

(1) A loading schedule, composed of graphs and tables based on pertinent data for use in loading that particular aircraft in a rapid manner for EMS/H operations, should be prepared.

(2) An index type weight and balance program using average load weights may be established in accordance with AC 120-27A, as revised. If an index-type weight and balance is used, the manual should contain the procedures for using, managing, and updating.

(3) These programs should include assorted aircraft occupant and equipment configurations (i.e., one or two pilots, two medical personnel, two patients, large carry-on equipment, balloon pumps, fuel in the most critical center of gravity location, etc.).

**g. Procedures for Flight Into Instrument Meteorological Conditions (IMC).** An operational procedure for inadvertent flight into IMC should be developed for inclusion in the certificate holder's operations manual. The procedures should address the applicable FAR pertaining to IFR including operations in an ATC radar environment as well as inadvertent IMC in isolated areas or a non-radar environment.

**NOTE:** This procedure should in no way be construed as authorizing or condoning actual IFR flights without meeting all IFR requirements.

The FAR Part 135 certificate holder/operator might choose to request the use of a discreet transponder code from the local ATC facility for use when conducting EMS/H operations in that area. This would provide positive identification during an EMS/H operation at all times. This procedure may be established with a Letter of Agreement between the operator and its local ATC facility.

**h. Night Experience.** The pilot in command must meet the requirements of FAR Part 61 and should complete a company night training program before conducting any night operations. Procedures for maintaining night currency in EMS/H operations should be developed and specified in the company training program. Such night training should be tailored to the operations of a certificate holder considering the experience level of EMS pilots, the area of operations and the management and safety policy for that operator.

**i. EMS/H Heliports.** Because of the operating environment (night, weather, and emergencies), EMS operations require a high degree of safety. FAR Part 135 EMS/H operations should only be conducted from heliports that meet the criteria established in AC 150/5390-2. For operations over congested areas, ingress/egress routes to EMS/H heliports may have to be identified for compliance with FAR Section 91.119.

**CHAPTER 4. SAFETY**

8. **GENERAL.** The commitment to safety must start at the top of an organization. The single most important element of a successful safety program is the commitment of senior management. Safety cannot be dictated - it must be practiced. Managers must display a prudent safe attitude by being involved in safety training. The following safety program recommendations are unique to EMS/H operations:

a. **Safety Program.** The safety program should be developed considering coordination, when necessary, with organizations that may be essential to the safe completion of an EMS/H mission. The operator may coordinate with one or more of the following organizations: ATC, hospitals, police and fire departments, and search and rescue organizations. An operator might hold briefing sessions with another organization prior to undertaking a specific EMS mission addressing topics concerning the aircraft operations.

b. **The certificate holder should designate a safety officer.** This individual should be familiar with each aspect of an EMS/H operation with particular emphasis on the safety requirements involved in the operation of helicopters. This individual should plan, organize, and disseminate information about the safety program to all involved persons.

c. **The program should encompass at least the following areas:** Safety in and around helicopters, site evaluation/preparation, weather analysis, communication equipment and procedures, facilities, and other areas deemed appropriate by the certificate holder and local FSDO.





APPENDIX 2. SAMPLE OPERATIONS SPECIFICATIONS

**A21. Emergency Medical Service - Helicopter (10/03/89).**

- a. The certificate holder is authorized to conduct VFR helicopter emergency medical service (evacuation) flights, including takeoff and landing operations provided the takeoff/landing site to be used is adequate for the proposed operation, considering size, type of surface, surrounding obstructions, and lighting. The certificate holder shall not conduct emergency medical service flights unless the pilot-in-command has satisfactorily completed the certificate holder's approved training program for such operations. If the operation is to be conducted at night, the takeoff/landing site must be clearly illuminated by a lighting source which will provide adequate lighting of the site and of obstructions which may create a potential hazard during approach, hovering, taxiing, and departure operations.
- b. The certificate holder is authorized to use the following VFR weather minimums for the conditions specified below when conducting emergency medical service (evacuation) flights. The certificate holder shall not use any lower VFR weather minimums for this type of operation.

*INSERT: Conditions, Areas, & VFR weather minimums for evacuation flights*

CONDITION	AREA	CEILING	VISIBILITY
DAY/NIGHT	LOCAL/CROSS COUNTRY		

- c. For the purpose of these operations specifications the day/night local area is described below. Any flight operation outside the local area is a cross country operation.

*INSERT: Description of Local Area Day/Night*

DESCRIPTION OF LOCAL AREA DAY/NIGHT

**ADDITIONAL TEXT ALLOWED**

APPENDIX 2. SAMPLE OPERATIONS SPECIFICATIONS (Continued)  
Sample Weight and Balance Loading Schedule

**PART E - WEIGHT AND BALANCE**

- E96. Weight and Balance Control Procedures ( 2/10/89). The following procedures have been established to maintain control of weight and balance of the certificate holder's aircraft operated under the terms of these specifications (identified below) and to ensure that these aircraft are loaded within the gross weight and center of gravity limitations:
- a. Procedures by which either actual or approved average passenger and crew weights may be used are in the operator's weight and balance control program.
  - b. Procedures by which either actual or approved average baggage weights may be used are in the operator's weight and balance control program.
  - c. The actual passenger and baggage weights shall be used in computing the weight and balance of charter flights and other special service involving the carriage of special groups.
  - d. All aircraft shall be weighed in accordance with the procedures for establishing individual or fleet aircraft weights outlined in the operator's weight and balance control program.
  - e. The following loading schedules and instructions shall be used for routine operations:

*INSERT: Aircraft, loading schedule info, and weight & balance control procedures*

AIRCRAFT MAKE/MODEL/SERIES	TYPE OF LOADING SCHEDULE	LOADING SCHEDULE INSTRUCTIONS	WEIGHT AND BALANCE CONTROL PROCEDURE

**ADDITIONAL TEXT ALLOWED**