U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Integration of Operations Control Centers into Helicopter Emergency Medical Services Operations	**Date:** 5/5/08 **Initiated by:** AFS-200	**AC No:** 120-96 **Change:**

1. PURPOSE. This advisory circular (AC) provides recommendations to assist helicopter emergency medical services (HEMS) operators with the development, implementation and integration of an Operations Control Center (OCC) and enhanced operational control procedures.

a. An operator's establishment of an OCC with enhanced operational control procedures provides numerous benefits, including improvements in:

- Risk assessment,
- Preflight information dissemination,
- Flight following,
- Information flow during a patient flight or repositioning flight, and
- Overall flight operations support.

b. A motivator for implementation of an OCC and enhanced operational control procedures is to improve the safety of HEMS operations. By encouraging HEMS operators to implement OCCs and enhanced operational control procedures, we hope the HEMS industry will realize an improved safety trend. We hope that these changes will improve safety the way the introduction of the "Commuter Rule" in 1996 helped reduce accident rates among Title 14 of the Code of Federal Regulations (14 CFR) part 135 operators.

NOTE: The HEMS industry uses two terms to represent the same basic entity: Operations Control Center (OCC) and Enhanced Operations Center (EOC). Other terms representing the same concept, such as System Operations Control (SOC) and System Operations Control Center (SOCC), are also in use throughout the aviation industry. For the sake of simplicity, this report will use the term Operations Control Center (OCC) to represent all of the terms referenced above.

2. APPLICABILITY. This AC recommends HEMS providers operating under part 135 Air Carrier Certificates establish an OCC and adopt enhanced operational control procedures.

a. Public service and governmental operators such as fire and law enforcement agencies conducting air medical transport as part of their mission profile are also highly encouraged to establish OCCs and adopt enhanced operational control procedures.

b. This AC does not constitute a regulation, but sets forth recommendations which may assist HEMS operators conducting flight operations under parts 135 and 91 to realize the safety (and economic) benefits of the implementation and integration of an OCC and enhanced operational control procedures.

NOTE: In addition to promoting an increase in safety practice, a business case can be made for the economic benefit to an organization from increased safety margins. In this AC, we do not provide the business case for an economic benefit associated with utilization of an OCC and enhanced operational control procedures, but we do propose a business case exists for those who wish to conduct the research.

3. **SCOPE.** This AC describes the characteristics of an OCC and key considerations associated with the design, implementation, and integration of an OCC and enhanced operational control procedures as applicable to the unique operating environment of HEMS operations.

a. The guidance within this AC is intended to assist HEMS operators in developing and integrating into HEMS operations OCCs and enhanced operational control procedures that more closely resemble the OCCs and operational control procedures used in part 121 operations. This AC recognizes that HEMS operations are unique, and as such have a set of requirements that are not identical to part 121 operations. There are well-developed OCCs and enhanced operational control procedures currently in use in support of part 121 operations that could assist HEMS operators when properly adapted to the dynamic conditions that make up the environment of HEMS operations.

b. This AC is intended for use in combination with other material contained in current ACs and other Federal Aviation Administration (FAA) approved guidance material.

c. This AC is not intended to supersede existing operational guidance, nor does the content mandate specific applications, technologies, or processes. It is designed to provide HEMS operators with an overview of key ideas, considerations, concepts, technologies, processes, and best practices for the development, implementation, and integration of an OCC and enhanced operational control processes in support of HEMS operations.

d. This AC is intended to assist HEMS operators by publicly disseminating information relating to best practices for OCCs and enhanced operational control found among part 121 operators and in use by some HEMS operators. We hope the publication of this information may assist HEMS operators to save time and maximize resources as they seek to investigate and implement the best practices to serve their specific needs.

4. **BACKGROUND.** HEMS operations provide an important service to the public in an environment with inherent risks. This risk level is due to the technically challenging nature of HEMS flight operations, the time-critical nature of such operations, and potential external

pressures placed upon operators by hospitals and other stakeholders to whom they provide such services.

a. The number of HEMS accidents nearly doubled between the mid-1990s and the HEMS industry's rapid growth period from 2000 to 2004. There were nine accidents in 1998, compared with 15 in 2004. There were a total of 83 accidents from 1998 through mid-2004[1]. An investigation ensued into probable causes and possible preventive measures that could have precluded these unfortunate events. The results often pointed to a lack of ground support personnel and enhanced operational control procedures as contributing factors. Findings of several investigations determined the use of a specialized OCC, qualified ground support personnel, and enhanced operational control procedures could have provided HEMS flightcrews with critical information invaluable to the flight safety decision process and thus may have mitigated or prevented the causes of many of these accidents.

b. To counter the increase in HEMS accidents in recent years, this AC is published to assist HEMS operators to identify strategies and technologies potentially aiding in the design, implementation, and integration of an OCC and enhanced operational control procedures.

c. While this AC is not compulsory in nature, it does provide recommendations that can assist HEMS operators to integrate tried-and-true enhanced operational control techniques that have contributed to, and have been validated by, the safety record of part 121 operations.

d. The effectiveness of an OCC and enhanced operational control processes arises from three core areas: personnel, technology, and procedures. We will discuss each of these areas in detail in subsequent paragraphs.

e. OCCs support flight operations through the enhanced skills of qualified ground support personnel. These personnel assist and support flightcrews by whatever means necessary. This support often comes in the form of providing flightcrews with key information critical to the evaluation of weather, landing zones, risk assessment, navigation, communication, or similar flight-critical subjects. Such information generally lends itself to acquisition by personnel in ground-based OCCs because certain specific technologies (e.g., software applications) and a minimum level of technical infrastructure (e.g., local area network (LAN) bandwidth) are required to facilitate the gathering and dissemination of this critical flight safety related information.

f. Additionally, specialized OCC personnel must receive aviation-specific knowledge and training beyond that of 911 dispatch operators and HEMS communication specialists. Many 911 dispatch operators and communication specialists, while extremely knowledgeable and highly qualified professionals, are not broadly trained in aviation-specific knowledge. They may only be able to provide minimal information regarding route, landing zone, and weather conditions. Enhanced aviation-specific training for these critical personnel is a key recommendation of this AC. The development of an enhanced, standardized communication specialist training curriculum which includes aviation-specific subject matter (similar to the FAA aircraft dispatcher training module subject matter presented by an FAA-approved school) and an

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[1] From http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=6763.

optional credential such as "Advanced HEMS Communication Specialist" are recommended steps for the industry.

g. Standardized enhanced operational control procedures provide for consistent methodologies for enhanced operations control in HEMS dispatch procedures. The use of standardized enhanced operational control procedures provides a way to ensure pertinent essential tasks are under surveillance, especially during periods of high work load and abnormal operations.

h. In summary, the integration of an OCC, ground support personnel and enhanced operational control procedures have been identified as keys to help enhance the safety of HEMS operations. After implementation and integration of an OCC, an ongoing or continuous improvement program should be established to ensure the HEMS OCC keeps providing a high quality of service.

5. RELATED REGULATIONS AND READING MATERIAL. See Appendix 1, Related Regulations and Reading Materials, for an extensive list of references.

6. DEFINITIONS.

a. Data Link. A general term referring to a variety of technologies used to transmit and receive electronic data wirelessly between on-aircraft systems and off-aircraft systems.

b. Geographic Information Systems (GIS). A collection of computer hardware, software, and geographic data designed to efficiently capture, store, manage, map, analyze, and display geographically referenced information.

c. Hard Copy. A copy of textual or graphic information from electronic media which is reproduced on paper.

d. Standard Operating Procedure (SOP). An established or prescribed method to be followed routinely for the performance of a designated operation or in a designated situation.

e. Tribal Knowledge. Unwritten information, either commonly or uncommonly known by members within an organization, such as population or company. This term is used most often in reference to information that may need to be known by members of the population or company in order to produce quality products or services. Tribal knowledge may be correct and key to quality performance, but it may also be inaccurate or totally incorrect.

7. ACRONYMS.

a. ASD. Aircraft Situational Display.

b. CFC. Certified Flight Communicator.

c. ETA. Estimated Time of Arrival.

d. FHWA. Federal Highway Administration.

e. **FOB.** Fuel on Board.

f. **GIS.** Geographic Information System.

g. **HEMS.** Helicopter Emergency Medical Services.

h. **ISP.** Internet Service Provider.

i. **IT.** Information Technology.

j. **LAN.** Local Area Network.

k. **MADIS.** Meteorological Assimilation Data Ingest System.

l. **METAR.** Routine Weather Reports.

m. **MOA.** Military Operations Areas.

n. **NAACS.** National Association of Airmedical Communication Specialists.

o. **NOTAM.** Notice to Airmen.

p. **OCC.** Operations Control Center.

q. **PIC.** Pilot in Command.

r. **RAID.** Redundant Array of Independent Drives.

s. **SATCOM.** Satellite Communication.

t. **SAO.** Special Area of Operation.

u. **SOP.** Standard Operating Procedure.

v. **SUA.** Special Use Airspace.

w. **TAF.** Terminal Area Forecasts.

x. **TFR.** Temporary Flight Restriction.

y. **UPS.** Uninterruptible Power Supply.

z. **VoIP.** Voice over Internet Protocol.

8. **OCC.** The function of an HEMS OCC is to support HEMS flights and HEMS pilots by:

a. Assisting with risk analysis,

b. Supplying the PIC with a variety of supplementary information (such as weather, landing zone, and route info),

c. Monitoring a variety of flight considerations (such as weather and FOB), and

d. Monitoring flight progression (including active flight following).

9. Flight Dispatch Procedures and Enhanced Operational Control Procedures. Part 121 operations require the use of FAA-certified aircraft dispatchers. FAA-certified aircraft dispatchers hold a federally issued Airman's license and perform flight dispatch functions.

a. The HEMS industry does not currently use FAA-certified aircraft dispatchers, and it is unlikely that the HEMS industry will begin the widespread use of FAA aircraft dispatchers in the near future, either through mandate or voluntary action. Additionally, the training program associated with FAA-certified aircraft dispatcher licensing is primarily focused on large, fixed wing, transport aircraft. Currently, no training program exists or has been designed specifically for HEMS aircraft dispatch operations.

b. Therefore, this AC will use the term "enhanced operational control procedures" because:

(1) The HEMS industry does not, in large part, currently utilize FAA-certified aircraft dispatchers to provide flight dispatch services, and

(2) The goal of this AC is to promote both the adaptation of flight dispatch procedures similar to those found in part 121 operations to the HEMS industry (taking into account both the dynamic environment and the procedural and technological knowledge transfer required to enable this adaptation).

10. CORE CONCEPTS OF OCCS AND ENHANCED OPERATIONAL CONTROL PROCEDURES.

a. Concept One: Joint Mission Responsibility. The main concept of OCCs and flight dispatch procedures is joint mission responsibility. Joint mission responsibility requires that at least one qualified ground staff member, in addition to the PIC, be responsible for monitoring factors affecting mission and flight status. The utilization of qualified support personnel on the ground also provides additional support and risk monitoring redundancy for pilots in high workload situations.

b. Concept Two: Written SOPs.

(1) The second core concept of OCCs and enhanced operational control procedures states that procedures must be standardized; furthermore, these standardized procedures must be written down so they can be referenced. We will refer to this concept throughout the rest of this AC as "written SOP(s)." Written SOPs may be accessed electronically or via hard copy paper documents.

(2) It is a practical reality that smaller operators often conduct operations to some extent through the utilization of tribal knowledge, informal procedures that are passed from one staff member to another staff member verbally. While this method of knowledge transfer has been in use throughout history, it is not optimal for use in modern day, safety critical air operations.

(a) Procedural errors, alterations and omissions are more likely to occur when procedures are executed without the ability to reference standardized written procedures, and when tribal knowledge must be relied upon for lack of written SOPs.

(b) Committing operational procedures to writing (especially critical procedures such as abnormal or emergency procedures) mitigates procedural errors, alterations, and omissions.

(3) Standardization of written procedures is the same core concept which mandates the use of checklists on the flight deck. SOPs are written down so they can be referenced and performed the same way each time.

(a) **Requirement: Availability of written SOPs.** As a general course of action, written SOPs may be accessed either electronically or via hard copy. However, it is important that written procedures are readily available, *especially* in times of high work load situations such as abnormal or emergency operations.

(b) **Requirement: Availability of hard copy access to SOPs.** Though the industry is moving towards a less paper environment, a truly paperless environment has yet to be achieved. A key technology (e.g., a LAN or workstation) may fail in conjunction with an emergency, or could even be the cause of emergency or abnormal operations. Technology failures may render electronic access to written SOPs unavailable. Therefore, while standard access to written SOPs may be accomplished electronically, there exists the potential for electronic access to become unavailable, especially in an emergency situation. Because of this, the requirement for availability of written SOPs mandates that operators maintain up-to-date and readily available hard copies of all critical procedures for access and use during abnormal or emergency operations.

(c) **Requirement: SOP for management of hard copy SOPs.** The requirement for hard copy SOPs therefore mandates that the operator also requires an SOP for managing hard copy documents. An SOP will be required for managing the revision, distribution, and maintenance of hard copy procedures documents.

(d) **Requirement: SOP for surveillance and revision of SOPs.** Operators must develop an SOP to provide for a continual internal loop to obtain feedback on SOPs and update these SOPs. An SOP is needed to act as a vehicle to continually receive feedback on procedures, update procedures, inform staff of changes to procedures, and train staff on new procedures.

c. Concept Three: Leveraging Technology and Communication. The third core concept of OCCs and enhanced operational control procedures is to leverage technology and communication to enhance safety and efficiency.

NOTE: It should be noted here that the subjects of technology and communication are increasingly interconnected, and it is increasingly difficult to separate any of discussion of one from the other.

(1) An OCC is an optimal environment for leveraging technology to support flight operations. An OCC's centralized location can provide economies of scale that make it

economically viable to invest in both the IT infrastructure and the IT support staff required to support that infrastructure.

(2) An OCC can leverage technology to provide communication and safety benefits to the HEMS operation. For example, an OCC may be able to acquire weather information for currently non-covered locations. This information may come from a variety of weather feeds which are considered non-traditional to the aviation community, and which typically are not available on the flight deck, in the field, or at communication centers. One example of this is the MADIS data feed provided by the FHWA.

NOTE: While observations from the MADIS feed are unofficial and may not possess the observation acuity of traditional aviation weather reporting instruments (e.g., visibility and ceiling may be absent), the observation data they produce is a step ahead of "flying blind" where no weather observation may otherwise exist. These observations may also be used as a cross-check reference against official Aviation METARs or TAFs.

11. DESCRIPTION OF POSSIBLE OCC INTEGRATION MODELS. Four basic models are described here for the integration of an OCC and enhanced operational control procedures into HEMS operations. The fourth model is a best case scenario and is currently not in use, mostly due to cost considerations. It is included here as an ideal model to move toward.

NOTE: In reality, there are not only four models, but a smooth continuum of possible models to draw from. Operators are encouraged to review possible configurations and adapt procedures that are best suited for their operation.

a. **Model One.** This model is likely to be appropriate for only the smallest HEMS operators.

(1) There should be an OCC specialist available for the PIC to consult with at will.

(2) The PIC should consult with an OCC specialist for flight approval concurrence at any time that a predetermined threshold is reached (e.g., risk assessment matrix).

(3) The OCC specialist maintains awareness of all considerations affecting operations (weather, communication, fuel, landing zone, etc.).

b. **Model Two.** This model represents the minimum baseline that the most HEMS operators should strive to achieve.

(1) The operator maintains an OCC which functions as a key enhanced operational control tool for the operator's entire fleet.

(2) Communication specialists (e.g., 911 dispatch, hospital communication specialists, etc.) coordinate with HEMS aircraft as always.

(3) The operator maintains an OCC staffed by at least one HEMS OCC specialist during all hours at which HEMS operations may occur.

(4) The PIC should consult with an OCC specialist for flight approval concurrence at any time that a predetermined threshold is reached (e.g., risk assessment matrix).

c. Model Three. Model three is similar to model two except that all communication centers are physically co-located within the OCC.

(1) This physical co-location may enhance communication between OCC specialists and the communication specialists.

(2) Ideally, OCC personnel work in "pods" of three OCC personnel each. Each pod contains one OCC specialist and two communication specialists, all working in concert.

d. Model Four. This model represents a best case scenario, but is currently not economically viable for most HEMS operators:

(1) One OCC maintains enhanced operational control for the operator's entire fleet.

(2) All communication centers are located within the OCC.

(3) Each and every flight segment is reviewed by both the PIC and an HEMS OCC specialist. Prior to this flight request acceptance, both the PIC and an HEMS OCC specialist should review a number of items, such as:

- Weather,
- Airworthiness,
- Fuel,
- Communication,
- Navigation,
- Terrain, and
- Landing Zone considerations.

(4) All communication specialists are fully qualified OCC specialists.

12. PERSONNEL. The following personnel positions are involved in HEMS operations and referenced throughout this AC.

a. Communication Specialist. A communication specialist may be employed by the HEMS operator, a hospital (i.e., a hospital communication specialist), or a local public safety agency (i.e., a 911 dispatch operator). The primary function of the communication specialist is to support HEMS operations by relaying coordination information among the flightcrew, hospital staff, on-scene personnel, and any other involved parties. Communication specialist duties should include flight following.

b. **Medical Crewmembers.** A medical crewmember is an individual who rides aboard an HEMS aircraft in conjunction with the performance of official duties. Crewmembers typically include:

- Flight nurses,
- Paramedics,
- Respiratory specialists,
- Neonatal specialists, and
- Other aviation trained specialists.

c. **IT Support Staff.** Individuals specifically trained to maintain and support an OCC's technology infrastructure. IT support staff may be employed by the HEMS operator or an external agency. At times, IT support staff may be required to support an OCC's IT infrastructure both from onsite and remote locations.

d. **OCC Specialist.** Employed by the HEMS operator, OCC specialists reside in the OCC and support HEMS operations by whatever means necessary. OCC specialists are typically highly knowledgeable in aviation-specific topics, and even knowledgeable with specific regard to the HEMS industry, the types of aircraft that are operated, and the dynamic environment in which they operate. OCC specialists may be HEMS pilots. While it is desirable that highly experienced HEMS pilots serve in the role of OCC specialist, any certificated airman with sufficient aviation knowledge can make a significant contribution to an OCC. Similarly, experienced communications specialists, with proper and adequate training in aviation subjects as recommended in this AC, can fill the role of OCC specialist.

> **NOTE: The HEMS industry currently uses two terms to represent the same entity: OCC specialist and OCC supervisor. These terms are analogous and interchangeable. This AC uses the term OCC specialist.**

e. **PIC.** The pilot who has final authority over the operation of an aircraft.

13. CORE PROCESSES. Core processes associated with OCC and enhanced operational control procedures are:

a. **Risk Assessment.**

b. **Information and Communication, including:**

- Weather,
- Landing zone,
- Airworthiness, and

- General mission coordination.

c. Flight Following.

14. OCC TECHNOLOGY AND TECHNOLOGY DESIGN CONSIDERATIONS. A key advantage of maintaining an OCC is the ability to leverage technology to enhance operational safety. The following technology topics should be considered when designing, implementing, and integrating an OCC and enhanced operational control procedures into HEMS operations.

a. Hardware and Software Resources. The technical complexity of an OCC is often relative to an operator's size. Hardware and software resources available in many OCCs generally include:

(1) Enabling Technologies:

- LAN, and
- Internet Access.

(2) ASD.

(3) Weather Analysis Tools:

- Textual,
- Graphical, and
- GIS enabled.

(4) NOTAM Tools:

- Textual, and
- Graphical

(5) Traffic Flow Tools:

- TFR,
- SUA/ SAO,
- MOA,
- High density and congested airspace,
- Warning areas, and
- Weather watch boxes.

(6) Communication Tools:

- Telephony (landline, mobile, VoIP),
- E-mail,
- Data link,
- Radio,
- SATCOM, and
- Advanced communication consoles.

(7) Television. In the event of a national security emergency or local disaster, news Web sites and phone lines (both landlines and mobile phones) may become inoperative due to the sheer volume of people trying to simultaneously access these resources. Therefore, a television may be the best means of acquiring information regarding where to send aircraft, where not to send aircraft, and where an accident is located if it is one of the operator's own aircraft.

b. Failure and Redundancy Considerations for Both Systems and Processes. As technology becomes ever more embedded as an integral part of flight operations, the impact on flight operations by a technology failure in an OCC becomes an ever greater concern. For example, the temporary failure of an OCC's LAN may render most of an OCC's functionality inoperative (e.g., phone system, communication console, e-mail, internet access, ASD, weather systems, data link, radios, etc.). Thus, it is important to plan for technology failures and design redundant systems and processes to ensure that the end results provided by all systems or processes remain the same. In addition to planning for temporary or less-severe failures and outages, severe technology failures should also be expected and prepared for by the development of an OCC IT disaster recovery plan.

(1) Common Technology Interruptions. Common technology interruptions that should be planned for when developing, implementing, and integrating an OCC include:

- Electrical power outages (localized to the building, the local area, or to a broader geographic area),
- LAN outages, and
- ISP or ISP connectivity outages.

(2) Key Redundancy Considerations – Hardware and Infrastructure. The following key redundancy considerations should be taken into account when designing redundancy into an OCC:

(a) ISP connectivity. More and more OCC applications are becoming Web-based. This means that if an OCC loses its connectivity to the Internet, any Web-based applications become inoperative. We therefore recommend that an OCC maintain at least two wholly independent connections to the Internet. The physical connections should enter the facility at physically opposite ends of the building, and they should be provided by two wholly independent companies. For example, two connections from the local Bell company will both become inoperative if the local Bell company's network switch goes down. Ideally, these connections should also be load-balanced with automatic failover.

(b) Server Location. Ideally, OCC Servers should be located in a secure data center which is hardened to protect against potential threats (e.g., flooding, hurricanes, tornados, etc.). If a hardened data center is not economically viable, then servers should be located in a secure location, preferably temperature controlled and shielded from fire sprinkler systems.

(c) Servers. Ideally, servers should be redundant with automatic failover and configured with RAID arrays.

(d) Workstations. Workstations should ideally be standardized for full interoperability so that any staff member can perform their duties at any workstation. For example either an OCC specialist or a communication specialist should be able to comfortably work at the same workstation on alternate shifts. Additionally, an OCC should maintain at least one "hot spare" workstation for immediate use, in case one of the workstations normally in use becomes inoperative.

(e) UPS. All workstations, servers, switches, and other key infrastructure should have UPS batteries in the power supply chain. The sustainable uptime of various UPS configurations is a cost consideration: the longer the time, the higher the cost. A good middle ground approach may be to install stronger UPS units on vital infrastructure and lighter UPS units on less critical infrastructure. As an example, a good plan may be to install three-hour UPS units on key servers and two workstations, and then install 30 minute UPS units on remaining workstations.

NOTE: With many VoIP phone systems, the VoIP system may still provide a dial-tone and phone access as long as the VoIP switch is powered. Therefore, putting a robust UPS unit on an OCC's VoIP switch will often keep the phone system up and running during critical operations, even if the VoIP server is down.

(3) Key Redundancy Considerations – Processes. OCC SOPs should include alternate processes that can suffice during abnormal operations. For example, if an OCC LAN or local workstation fails, then phone numbers which are accessed electronically may become unavailable. Therefore, a key process to for which redundancy is required is an alternate means of accessing phone numbers. The following are basic core processes for which alternate (redundant) processes should be developed. While the list below may look as if it is hardware centric, the list is actually process centric: many processes are now hardware dependent.

(a) Phones and communication. Mobile phones may provide a temporary work-around for inoperative main phone systems and radios.

(b) Phone numbers. A hard copy set of all phone numbers should be kept at each workstation. If the LAN or local workstation fails, all phone numbers which are generally accessed electronically may become inaccessible. As mentioned previously, this in turn mandates that SOPs are also needed to maintain and update these hard copy phone number lists.

(c) **Internet access.** One or more laptop personal computers (PC) with cellular data modems may provide temporary Internet connectivity while primary connectivity is down.

NOTE: At the time of this writing, cellular data cards for laptop connectivity are providing 1.8 megabits per second (Mbps) throughput which is usable for most types of OCC applications.

(d) **Flight following.** Flight following processes often rely on electronic applications such as ASDs or specialized communication gear (radio, data link, SATCOM, etc.). In turn, these specialized flight following technologies often rely on Internet and/or LAN connectivity somewhere in the data chain to transmit the aircraft location information to the flight follower. Therefore, it is important that an operator identifies alternate flight following procedures in the event that the primary flight following application and procedures become inoperative. Alternate flight following procedures generally call for alternate means of communication to track the aircraft (e.g., communication with outstations, hospitals, law enforcement, other aircraft, air traffic control (ATC), Flight Service Station (FSS), etc.).

(4) **IT Support Staff and Processes.** An OCC's technology infrastructure requires IT support staff for ongoing maintenance and support.

(a) An OCC requires IT support to repair inoperative items, including on-call support for critical items which require immediate repair. IT support can be achieved via in-house support staff or external outsourced support staff.

(b) An OCC will require an SOP for reporting and tracking inoperative technology resources. Helpdesk ticket software applications can be acquired relatively inexpensively.

(c) Information Security (INFOSEC) SOPs should be developed to protect the OCC IT infrastructure from damage, both malicious and unintentional.

(d) Various IT industry best practices should be put in place by an OCC's IT support staff in order to provide the OCC with business continuity in the event of an IT failure or interruption. Typical IT SOPs provide for information failover, backup, recovery, restoration, and reconstruction. Each of these processes is distinct and requires SOPs to be in place prior to a technology failure event.

- *Failover* refers to seamless data and process continuity as one system fails (e.g., a hard drive) and a redundant system immediately provides resource continuity despite the failure of the first system.
- *Backup* refers to the process of preparing a copy of data for later use in the event that the original operational data becomes lost or unusable.
- *Recovery* refers to the process of recovering data which has been lost from a system.

- *Restoration* refers to the act of restoring data to an otherwise functioning system.

- *Reconstruction* refers to the act of reconstructing a software application which has become unusable and needs to be rebuilt from the ground up.

c. Miscellaneous Technology Considerations.

(1) Under the hub and spoke system (an OCC being the hub and communication centers being spokes), operators may encounter technology challenges as they begin to tie in all of the communication centers with the OCC during initial implementation of an OCC. This should be expected. With proper planning, technology exists to overcome these challenges.

(2) The newly revised operations specification (OpSpec) A008 requires that the certificate holders make available to the FAA a list of all communication specialists who exercise enhanced operational control. Various technologies in an OCC can assist with fulfilling this requirement.

15. OCC PHYSICAL SPACE DESIGN CONSIDERATIONS. The following human factors and physical space considerations should be taken into account when designing the layout of an OCC.

a. Physical Room Layout. Interpersonal communication, visual lines of sight, and the auditory profile of a room are key considerations when designing the physical layout of an OCC.

(1) **Size of Room.** The room should be small enough for individuals to be able to see and hear discussions within the room for situational awareness. However, the room should not be so loud as to hamper communication.

(2) **Visual Lines of Sight.** Personnel should be able to see their colleagues. Walls that segregate personnel are undesirable.

(3) **Pods.** Pod-type workstation areas, where one to four OCC personnel work in small work groups, often provide admirable results.

b. Physical Workstation Areas. Because OCC personnel often work long shifts and sit for extended periods of time, the design of physical workstation areas is important.

(1) **Chairs.** Chairs should be comfortable. High backed chairs that rock, swivel, and have wheels are preferable.

(2) **Main Desk Surface Area.** The main horizontal surface plan of the desk or workstation should not be too high or too low. There should be ample desk surface area to comfortably spread out work materials.

(3) **Shelving and Storage.** There should be ample shelving to aid in keeping items off of the desk surface area. There should also be ample filing and storage capacity.

(4) Lighting. Lighting is an important consideration. Many OCC personnel find it desirable to work under reduced intensity lighting. Dimmable halogen lights work well. Fluorescent lighting is discouraged, as the rapid light cycles tend to cause fatigue.

(5) Monitor Surface Area. Workstations should contain ample computer monitor surface area. OCC personnel may be working with numerous software applications simultaneously. We recommend having two to four computer monitors to assist with the simultaneous display of multiple software applications. A popular practice at many OCCs is to have one monitor devoted to displaying an ASD, one monitor devoted to communication, and a third monitor used to display any remaining applications.

16. CRITICAL ROLE OF COMPANY PHILOSOPHY AND EXECUTIVE/SENIOR MANAGEMENT. Many existing communication centers have evolved and operated mostly autonomously since their inception. HEMS operators may experience some resistance from the previously autonomous communication centers as an OCC comes online and a culture shift begins to occur. You should anticipate this effect, and plan to overcome it through education and communication.

a. It is important that an HEMS operator's entire organization embraces and promotes a global corporate philosophy which centers on an OCC and enhanced operational control procedures. This philosophy may be a change at some organizations where outlying bases and flightcrews had previously functioned somewhat autonomously.

b. It is important to instill a company philosophy that flight operations are a team effort. They are not simply a matter of a flightcrew receiving basic flight request information and then it being the flightcrew's responsibility to complete the flight.

17. EMERGENCY AND ABNORMAL OPERATIONS. The longer that an OCC and enhanced operational control procedures have been incorporated into an HEMS operation, the more entrenched their use becomes. This results in a greater impact of their presence or absence during abnormal or emergency operations.

a. For this reason, it is important that operators have prepared in advance:

- Procedures that most effectively leverage resources available in the OCC during abnormal or emergency operations, and
- Procedures to effectively manage the loss of an OCC and enhanced operational control procedures which then leads to abnormal operations.

b. Once these procedures have been prepared, the operator should conduct regular drills to test and refresh these procedures. Drills should be conducted annually at minimum; more often is preferred.

18. TRAINING.

a. HEMS OCC Specialist Training. Currently, there are no regulatory training requirements for OCC specialists. Preferably, HEMS OCC specialists should be highly experienced helicopter pilots and, ideally, highly experienced HEMS pilots. OCC specialists may be helicopter pilots who have lost their medical, or no longer choose to fly.

(1) In addition to there being no regulatory training or qualification requirements for OCC specialists, it is often the case that no specialized training is offered for OCC specialists other than for technical instruction on communication and computer systems.

(2) We recommend in this AC that the industry move toward a curriculum of standardized training module topics for OCC specialists. A recommended outline of subjects is included in Appendix 3.

b. Communication Specialists Training.

(1) Communication specialists may be employed by the HEMS operator, a hospital, or local law enforcement (e.g., local public safety or 911 dispatchers).

(2) Currently, there are no regulatory qualifications requirements for communication specialists; communication specialists are at this time trained only to the specifications of their employer. This training rarely, if ever, provides in-depth discussion of aviation-specific topics. However, if communication specialists are providing service to the certificate holder through either contract or agreement, then the communication specialists must be trained by the certificate holder to its standards.

(3) Communication specialists may receive training to obtain the CFC credential from the NAACS. This training certification is at the discretion of the HEMS operator. The NAACS CFC credential, while excellent, does not provide detailed, aviation-specific training similar to those module subjects associated with the FAA aircraft dispatcher certification.

(4) A core recommendation of this AC is that communication specialists receive training in aviation-specific subject matter appropriate to the operation. A list of recommended aviation-specific training subjects for HEMS communication specialists is located in Appendix 3 of this AC. This list of recommended training subjects is modeled on the list of standardized training modules and elements from the FAA aircraft dispatcher training curriculum.

19. Auditing. It is important that an operator conducts regular audits of both OCC and enhanced operational control procedures and training programs to assess and assure that procedures are effective, being followed, and being trained correctly. Audits should be accomplished both on regular, pre-determined schedules and also as unannounced surprise audits. The auditor should utilize written checklists. SOPs should be developed to identify and address any deficiencies until such deficiencies are corrected.

20. Summary. HEMS operators are encouraged to realize enhanced safety benefits by incorporating an OCC and standardized enhanced operational control procedures into their operations and organizational culture.

a. An OCC and enhanced operational control procedures provide enhanced safety benefits to HEMS operations. Benefits include the ability to leverage technology and provide greater flightcrew support from qualified ground personnel. This support most often comes in the form of specialized and detailed critical flight information (e.g., weather, landing zone, navigation, communication, coordination, etc.) and assistance with risk analysis.

b. Operators are encouraged to adapt or augment communication specialists' training syllabi to include a greater degree of aviation-specific subjects similar to those subjects included in the FAA aircraft dispatcher training curriculum.

ORIGINAL SIGNED by

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Director, Flight Standards Service

APPENDIX 1. RELATED REGULATIONS AND READING MATERIALS

The following Title 14 CFR regulations, advisory circulars (AC), orders, and other guidance are pertinent to the design, implementation and integration of HEMS Operations Control Centers (OCC) and enhanced operational control policies:

14 CFR Part 91 Regulations
§ **91.3,** Responsibility and authority of the pilot in command
§ **91.13,** Careless or reckless operation
§ **91.103,** Preflight action
§ **91.119,** Minimum safe altitudes: General
§ **91.133,** Restricted and prohibited areas
§ **91.157,** Special VFR weather minimums

14 CFR Part 135 Regulations
Subpart A – General
§ **135.21,** Manual requirements
§ **135.23,** Manual contents
Subpart B – Flight Operations
§ **135.63,** Recordkeeping requirements
§ **135.67,** Reporting potentially hazardous meteorological conditions and irregularities of communications or navigation facilities
§ **135.69,** Restriction or suspension of operations: Continuation of flight in an emergency
§ **135.77,** Responsibility for operational control
§ **135.79,** Flight locating requirements
§ **135.81,** Informing personnel of operational information and appropriate changes
Subpart F – Crewmember Flight Time and Duty Period Limitations and Rest Requirements
§ **135.271,** Helicopter hospital emergency medical evacuation service (HEMES)

ACs, Notices, Orders, Operations Specifications (current editions)
AC 00-6, Aviations Weather for Pilots and Flight Operations
AC 00-24, Thunderstorms
AC 00-45, Aviation Weather Services
AC 00-54, Pilot Windshear Guide
AC 00-57, Hazardous Mountain Winds and Their Visual Indicators
AC 00-64, Air Medical Resource Management
AC 60-22, Aeronautical Decision Making
AC 61-134, General Aviation Controlled Flight into Terrain Awareness
AC 91-32, Safety in and Around Helicopters
AC 120-51, Crew Resource Management Training
AC 120-54, Advanced Qualification Program
AC 120-71, Standard Operating Procedures for Flight Deck Crewmembers
AC 120-92, Introduction to Safety Management Systems for Air Operators
AC 135-14, Emergency Medical Services/Helicopter (EMS/H)
FAA-H-8083-21 Rotorcraft Flying Handbook
FAA Order 8900.1 Flight Standards Information Management System (FSIMS)
Operations Specification A002, Definitions and Abbreviations
Operations Specification A008, Operational Control
Operations Specification A021, VFR Weather Requirements for HEMS Operations

APPENDIX 2. AUDIT CHECKLIST

ITEM	YES	NO	COMMENTS
Copy of Op Specs			
Copy of GOM			
Copy of MEL			
Aeronautical Decisionmaking and Risk Management Guidance Material			
Copy of Emergency Procedures Manual			e.g., a/c accident enroute or at base, SAR for flight opns; OCC disaster for admin considerations
Basic Flight Following			
Back-up or Alternate Flight Following			
Enhanced Flight Following (Graphical; SATCOM-based; etc.)			
Shift Turnover Briefing (between Comm Specs)			
Initial Shift Briefing (Comm Spec to Flightcrew)			
Pre-Flight briefing (Comm Spec to Flightcrew)			
In-flight Updates (Comm Spec to Flightcrew)			
In-flight Updates (Flightcrew to Comm Spec)			
Post-Flight De-brief (Flightcrew to Comm Spec)			
Crew Duty Time Tracking			

APPENDIX 3. COMMUNICATION SPECIALISTS RECOMMENDED AVIATION-SPECIFIC TRAINING CURRICULUM

The following modules and elements comprise the recommended aviation-specific training curriculum for HEMS communication specialists:

Modules and Elements

Aviation Policy and Regulation
Title 14 CFR
Operations Specifications
Company General Operations Policies
Enhanced Operational Control Policies
Aeronautical Decision Making and Risk Management
Lost Procedures
Emergency Procedures / Search and Rescue

Aviation Weather
General Meteorology
Prevailing Weather
Adverse and Deteriorating Weather
Windshear
Icing Conditions
Use of Aviation Weather Products
Available Sources of Information (e.g., http://weather.aero/hems/)
Weather Minimums

Navigation
Navigation Aids
Instrument Approach Procedures
Navigational Publications
Navigation Techniques

Flight Following
Available Flight Following Procedures
Alternate Flight Following Procedures

Air Traffic Control
Airspace
ATC Procedures
Aeronautical Charts
Aeronautical Data Sources

Aviation Communication
Available Aircraft Communications Systems
Normal Communication Procedures
Abnormal Communications Procedures

Emergency Communications Procedures

Aircraft Systems
Communications Systems
Navigation Systems
Surveillance systems
Fueling Systems
Specialized Systems
General Maintenance Requirements
Minimum Equipment List

Aircraft Limitations and Performance
Aircraft Operational Limitations
Aircraft Performance
Weight and Balance Procedures and Limitations
Landing Zone and Landing Facility Requirements

Crew Resource Management
Concepts and Practical Application

Local Flying Area Orientation
Terrain Features
Obstructions
"Weather Producers" (e.g., industrial areas, fog prone areas, etc.)
Air Space and ATC Facilities
Heliports, Airports, Landing Zones and Fuel Facilities
Instrument Approaches
Predominant Air Traffic Flow
Landmarks and Cultural Features
Local Resources and Contact Information (ATC, Law Enforcement, Fire, Coast Guard, search and rescue, etc., contacts (radio, telephone)