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DIRECTORATE GENERAL OF CIVIL AVIATION

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OPERATIONS CIRCULAR

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Subject: **HELICOPTER EMERGENCY MEDICAL SERVICES (HEMS)**

PART I - INTRODUCTION

1. PURPOSE

1.1 This Operations Circular (OC 05 of 2015), establishes approval requirements, equipment prerequisites, operational stipulations and training standards for operators seeking authorisation for Helicopter Emergency Medical Services (HEMS) operation.

2. RELEVANT REGULATIONS

2.1 Rule 133A of Indian Aircraft Rules 1937.

2.2 CAR Section 8 Series H Part I – Commercial Helicopters Operations.

2.3 CAR Section 4 Series B Part III – Heliports.

2.4 CAR Section 8 Series D Part I – Load and Trim Sheet.

3. REFERENCE APPENDICES IN THIS OC

3.1 Appendix I – HEMS Operations Control Centre (HOCC).

3.2 Appendix II – HEMS Operating Base Facilities.

3.3 Appendix III - Operations without safe forced landing capability.

3.4 Appendix IV - AMC HEMS Operational Training (HOT) Flight crew and HHO Crewmember.

3.5 Appendix V - AMC Night Vision Imaging System (NVIS) Training and Checking.

3.6 Appendix VI - AMC HHO Training & Checking.

3.7 Appendix VII - GM HEMS Operational Training (HOT) for Medical Crew.

3.8 Appendix VIII - GM HEMS Operational Training (HOT) for GEMS.

4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions. For the purpose of this OC, the following definitions shall apply:-

4.1.1 'Air ambulance' means on-demand non-scheduled flight used for the specific carriage of medical personnel, supplies or patients. Such flights are not always on standby and are governed by normal commercial air transport rules.

4.1.2 'Aircraft tracking' means a ground based process that maintains and updates at standardised intervals, a record of the four dimensional position of individual aircraft in flight.

4.1.3 'Category A helicopters' means a multi-engined helicopter designed with engine and system isolation features specified in the applicable airworthiness codes and capable of operations using take-off and landing data scheduled under a critical engine failure concept that assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off in the event of engine failure.

4.1.4 'Category B helicopters' means a single-engined or multi-engined helicopter that does not meet Category A standards. Category B helicopters

have no guaranteed capability to continue safe flight in the event of an engine failure, and unscheduled landing is assumed.

4.1.5 'Ceiling' means the height above the ground or water of the base of the lowest layer of cloud below 6000 m (20,000 ft) covering more than half the sky.

4.1.6 'Cloud base' means the height of the base of the lowest observed or forecast cloud element in the vicinity of an aerodrome or operating site or within a specified area of operations, normally measured above aerodrome elevation or, in the case of offshore operations, above mean sea level.

4.1.7 'Congested area' means in relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes.

4.1.8 'Contingency fuel' means the fuel required to compensate for unforeseen factors that could have an influence on the fuel consumption to the destination aerodrome or helipad.

4.1.9 'Converted meteorological visibility (CMV)' means a value, equivalent to an RVR, which is derived from the reported meteorological visibility.

4.1.10 'Critical phases of flight' in the case of helicopters means taxiing, hovering, take-off , final approach, missed approach, the landing and any other phases of flight as determined by the Pilot-in-Command or Commander.

4.1.11 'D' denotes the largest dimension of the helicopter when the rotors are turning.

4.1.12 'Dangerous goods (DG)' means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

4.1.13 'Distance DR' means the horizontal distance that the helicopter has travelled from the end of the take-off distance available.

4.1.14 'Elevated final approach and take-off area (elevated FATO)' means a FATO that is at least 3 m above the surrounding surface.

4.1.15 'Emergency locator transmitter' is a generic term describing equipment that broadcasts distinctive signals on designated frequencies

and, depending on application, may be activated by impact or may be manually activated.

4.1.16 'Exposure time' means the actual period during which the performance of the helicopter with the critical engine inoperative in still air does not guarantee a safe forced landing or the safe continuation of the flight.

4.1.17 'Final approach and take-off area (FATO)' means a defined area for helicopter operations, over which the final phase of the approach manoeuvre to hover or land is completed, and from which the take-off manoeuvre is commenced. In the case of helicopters operating in Performance Class 1, the defined area includes the rejected take-off area available.

4.1.18 'Flight data monitoring (FDM)' means the proactive and non-punitive use of digital flight data from routine operations to improve aviation safety.

4.1.19 'Flight following' means the task of maintaining contact with specified aircraft for the purpose of determining en route progress and/or flight termination.

4.1.20 'Flight simulation training device (FSTD)' means any one of the following three types of apparatus in which flight conditions are simulated on the ground:

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

4.1.21 'Geographic area of operations' means a defined area primarily served by HEMS service within which the HOCC and aircrew has demonstrated detailed local knowledge.

4.1.22 'Ground emergency service personnel' means any ground emergency service personnel (such as policemen, firemen, etc.) involved with helicopter emergency medical services (HEMSs) and whose tasks are to any extent pertinent to helicopter operations.

4.1.23 'Grounding' means the formal prohibition of an aircraft to take-off and the taking of such steps as are necessary to detain it.

4.1.24 'HHO (Helicopter hoist operation) crew member' means a technical crew member who performs assigned duties relating to the operation of a hoist.

4.1.25 'Helideck' means a FATO located on a floating or fixed offshore structure.

4.1.26 'HEMS crew member' means a technical crew member who is assigned to a HEMS flight for the purpose of attending to any person in need of medical assistance carried in the helicopter and assisting the pilot during the mission. In HEMS this typically would be the HHO crew member.

4.1.27 'HEMS flight' means a flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential. The complete definition is as defined in Para 6 of this Ops Circular.

4.1.28 'HEMS medical crew member' means a medical person carried in a helicopter during a HEMS flight, limited to doctors, nurses and paramedics who has received HEMS training.

4.1.29 'HEMS operating base' means an aerodrome/helipad at which the HEMS crew members and the HEMS helicopter may be on stand-by for HEMS operations.

4.1.30 'HEMS operational control centre (HOCC)' means a place from where the coordination or control of the HEMS flight takes place. It may be located in a HEMS operating base.

4.1.31 'HEMS operating site' means a site selected by the commander during a HEMS flight for helicopter hoist operations, landing and take-off. This is a site other than an airfield or heliport. Usage of the term may be interchangeable with LZ.

4.1.32 'HHO flight' means a flight by a helicopter operating under an HHO approval, the purpose of which is to facilitate the transfer of persons and/or cargo by means of a helicopter hoist.

4.1.33 'HHO offshore' means a flight by a helicopter operating under an HHO approval, the purpose of which is to facilitate the transfer of persons and/or cargo by means of a helicopter hoist from or to a vessel or structure in a sea area or to the sea itself.

4.1.34 'HHO passenger' means a person who is to be transferred by means of a helicopter hoist.

4.1.35 'Hostile environment' means an environment in which:

(i) a safe forced landing cannot be accomplished because the surface is inadequate, or

(ii) the helicopter occupants cannot be adequately protected from the elements, or

(iii) search and rescue response/capability is not provided consistent with anticipated exposure. or, there is an unacceptable risk of endangering persons or property on the ground.

In any case, the following areas shall be considered hostile:-

(i) open sea areas considered to constitute a hostile environment and designated by the appropriate authority in the appropriate Aeronautical Information Publication or other suitable documentation.

(ii) those parts of a congested area without adequate safe forced landing areas.

4.1.36 'In - Flight Shutdown (IFSD)' means when an engine ceases to function in flight and is shutdown, whether self-induced, crew initiated or caused by some other external influence (i.e. IFSD for all cases. for example due to flameout, internal failure, crew initiated shutoff, foreign object ingestion, icing, inability to obtain and/or control desired thrust etc.).

4.1.37 'Landing Zone (LZ)' means a specified area where a helicopter may land to embark/disembark passenger or payload, or may hover to conduct HHO. This term is interchangeable with HEMS operating site.

4.1.38 'Medical passenger' means a medical person carried in a helicopter during a HEMS flight, including but not limited to doctors, nurses and paramedics.

4.1.39 'Night' means the period half an hour after local sunset and half an hour before local sunrise.

4.1.40 'Night vision goggles (NVG)' means a head-mounted, binocular, light intensification appliance that enhances the ability to maintain visual surface references at night.

4.1.41 'Night vision imaging system (NVIS)' means the integration of all elements required to successfully and safely use NVGs while operating a helicopter. The system includes as a minimum: NVGs, NVIS lighting, helicopter components such as radio altimeter, visual warning system and audio warning system, training and continuing airworthiness.

4.1.42 'Non-hostile environment' means an environment in which:

(i) A safe forced landing can be accomplished, or

(ii) The helicopter occupants can be protected from the elements and search and rescue response/capability is provided consistent with the anticipated exposure.

(iii) In any case, those parts of a congested area with adequate safe forced landing areas shall be considered non-hostile.

4.1.43 'NVIS crew member' means a technical crew member assigned to an NVIS flight.

4.1.44 'NVIS flight' means a flight under night visual meteorological conditions (VMC) with the flight crew using NVGs in a helicopter operating under an NVIS approval.

4.1.45 'Offshore operations' means operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations.

4.1.46 'Operation in performance class 1' means an operation that, in the event of failure of the critical engine, the helicopter is able to land within the rejected take-off distance available or safely continue the flight to an appropriate landing area, depending on when the failure occurs.

4.1.47 ‘Operation in performance class 2’ means an operation that, in the event of failure of the critical engine, performance is available to enable the helicopter to safely continue the flight, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

4.1.48 ‘Operation in performance class 3’ means an operation that, in the event of an engine failure at any time during the flight, a forced landing may be required in a multi-engined helicopter and will be required in a single-engined helicopter.

4.1.49 ‘Operational control’ means the responsibility for the initiation, continuation, termination or diversion of a flight in the interest of safety.

4.1.50 ‘Personal locator beacon (PLB)’ means an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.

4.1.51 ‘Pilot-in-command’ means the pilot designated as being in command and charged with the safe conduct of the flight. For the purpose of commercial air transport operations, the ‘pilot-in-command’ shall be termed the ‘commander’.

4.1.52 ‘Public interest site (PIS)’ means a site used exclusively for operations in the public interest. An example of a public interest site is a landing site based at a hospital located in a hostile environment in a congested area, which due to its size or obstacle environment does not allow the application of performance class 1 requirements that would otherwise be required for operations in a congested hostile environment.

4.1.53 ‘Rectification interval’ means a limitation on the duration of operations with inoperative equipment.

4.1.54 ‘Runway visual range (RVR)’ means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

4.1.55 ‘Safe forced landing’ means an unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

4.1.56 ‘Special VFR flight’ means a VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC.

4.1.57 ‘Take-off alternate aerodrome’ means an alternate aerodrome at which an aircraft can land should this become necessary shortly after take-off and if it is not possible to use the aerodrome of departure.

4.1.58 ‘Take-off flight path’ means the vertical and horizontal path, with the critical engine inoperative, from a specified point in the take-off for aeroplanes to 1500 ft above the surface and for helicopters to 1000 ft above the surface.

4.1.59 ‘Take-off mass’ means the mass including everything and everyone carried at the commencement of the take-off for helicopters and take-off run for aeroplanes.

4.1.60 ‘Technical crew member’ means a crew member in commercial air transport HEMS, HHO or NVIS operations other than a flight or cabin crew member, assigned by the operator to duties in the aircraft or on the ground for the purpose of assisting the pilot during HEMS, HHO or NVIS operations, which may require the operation of specialised on-board equipment.

4.1.61 “Technical Instructions” means the instructions for the safe transport of dangerous goods by air, approved and issued periodically in accordance with the procedure established by the International Civil Aviation Organisation Council.

4.1.62 ‘Touch down and lift-off area (TLOF)’ means a load-bearing area on which a helicopter may touch down or lift off.

4.1.63 ‘Unaided NVIS flight’ means, in the case of NVIS operations, that portion of a VFR flight performed at night when a crew member is not using NVG.

4.1.64 ‘Visual approach’ means an approach when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to the terrain.

4.1.65 ‘V_{TOSS}’ means take-off safety speed or the minimum speed at which climb shall be achieved with the critical power-unit inoperative, the remaining engines operating within approved operating limits.

4.2 Abbreviations.

ADRS	Aircraft Data Recording System
AIRS	Airborne Image Recording System
AMC	Acceptable Means of Compliance
CARS	Cockpit Audio Recording System
DG	Dangerous Goods
DLRS	Data Link Recording System
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMS	Emergency Medical Services
FATO	Final Approach and Take-off Area
FDM	Flight Data Monitoring
FSTD	Flight Simulation Training Device
GEMS	Ground Emergency Medical Services
GM	Guidance Material
GSM	Global System for Mobile Communications
HEMS	Helicopter Emergency Medical Services
HHO	Helicopter Hoist Operations
HOCC	HEMS Operational Control Centre
HTAWS	Helicopter Terrain Awareness and Warning System
HUMS	Helicopter Usage Monitoring System
IFSD	In - Flight Shutdown
LZ	Landing Zone
MOPS	Minimum Operational Performance Standards

MPED	Medical Portable Electronic Devices
NVIS	Night Vision Imaging System
NVG	Night Vision Goggles
OpSpec	Operational Specifications
PIS	Public Interest Site
RTCA	Radio Technical Commission for Aeronautics
SA	Situational Awareness
WSPS	Wire Strike Protection System
V_{TOSS}	Take-off Safety Speed

5. INTRODUCTION

5.1 Emergency Medical Services (EMS) in India conventionally utilises road ambulances in medical emergency cases for urgent transport of critically ill or grievously injured patients to intensive care level management in a hospital. The goal of Ground EMS (GEMS) in such cases is to provide timely medical aid by the removal of patient to the next point of definitive care as quickly as possible with minimal on-site medical care.

5.2 The utilisation of helicopter in EMS role, or Helicopter Emergency Medical Services (HEMS) is a modern trauma care delivery system. It provides clinical benefits by shortening the time to delivery of definitive care to patients with time-sensitive medical conditions, provide necessary specialised medical expertise/ equipment to patients before and/or during transport, or provide transport to patients inaccessible by other means of transport. It is a dedicated service which is always on standby with medical intervention technology and onboard medical expertise that far surpasses GEMS ambulance. HEMS is not merely a patient transportation system but a trauma response system that can stabilize and treat critical patients by intervention procedures if required, leading to dramatic improvement of outcomes.

5.3 Helicopters due to their capability to hover and land without being constrained to runways and achieve high speeds, are ideal delivery systems for EMS because it can vault across road traffic delays and are unaffected by terrain. HEMS exploits the tenet of trauma management that clinical benefit increases considerably when

care is delivered within the golden hour. The golden hour in EMS parlance is the time period where access to definitive care within an hour of occurrence of life-threatening trauma can make all the difference between life and death.

5.4 HEMS is not a substitute for GEMS ambulance service but is about an incremental improvement, expanded capability and enhanced accessibility. An efficient HEMS system expands the capability of the national trauma response system by enlarging the reach in any geographical setting but particularly in conditions where ground transportation is limited by terrain or traffic, and in areas where demographics and hospitals are widely dispersed.

5.5 HEMS due to its activity profile of swift tempo of operations and oft-unfamiliar operating environment, places itself at a much higher risk as compared to other commercial air transportation ventures. Consequently, the industry worldwide has been bedevilled by a higher accident/incident rate as compared to any other form of aerial transportation. Since HEMS straddles two complex environments of medicine and aviation it is far more intricate than GEMS in logistical planning as well in the effort to ensure effective system performance with safety.

6. DEFINING HEMS

6.1 HEMS flight means a flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential by carrying:-

(a) Medical personnel. or

(b) Medical supplies (equipment, blood, organs, drugs). or

(c) Any ill or injured persons and other persons directly involved.

6.2 A HEMS flight or mission shall normally start and end at the HEMS operating base following tasking by the HEMS operational control centre. Tasking can also occur when airborne, or on the ground at locations other than the HEMS operating base. The following elements are regarded as integral parts of the HEMS flight:-

(a) flights to and from the HEMS operating site when initiated by the HEMS operational control centre.

(b) flights to and from an aerodrome/operating site for the delivery or pick-up of medical supplies and/or persons required for completion of the HEMS mission. and

(c) flights to and from an aerodrome/operating site for refuelling required for completion of the HEMS mission.

7. HEMS PHILOSOPHY

7.1 HEMS is an operation in the interest of the general public and for a social cause and accordingly alleviation from the normal Commercial Air Transport (CAT) rules has been made admissible. However, alleviations are permissible only when appropriately mitigated by technology that ensures safer operations, stringent crew experience/training requirements and comprehensive operational usage procedures. Such operational credits are considered as risk offsets accrued due to increased use of technology that enhances safety and onus of higher levels of training of aircrew, as compared to other CAT operators.

7.2 It may be noted that a HEMS mission is not limited to transportation of a patient itself but also includes transportation of medical personnel and medical supplies with the overriding objective of an immediate and rapid transfer. In case this objective is lacking or the flight urgency is lower, the mission acquires the role of an air ambulance flight. An operator who has been accorded specific approval for HEMS may conduct a medical flight as HEMS flight or as an air ambulance flight depending upon the medical urgency. This nuanced difference can be exemplified using a road ambulance analogy:-

(a) If called to an emergency, an ambulance would proceed at great speed sounding its siren and proceeding against traffic lights – thus matching the risk of operation to the risk of a potential death (= HEMS operations).

(b) For a transfer of a patient (or equipment) where life and death (or consequential injury of ground transport) is not an issue, the journey would be conducted without sirens and within normal rules of motoring – once again matching the risk to the task (= air ambulance operations).

7.3 On-demand flights which do not have continuous standby periods and specifically carry medical personnel, supplies or patients are air ambulance operations and shall be governed by normal CAT rules.

8. HEMS OPERATIONAL SCENARIOS

8.1 Any HEMS flight responding to a medical requirement can have the following three relatively distinct operational scenarios:-

(a) Primary Response.

This is a scenario which involves transport of medical personnel and equipment direct to the scene of requirement. This could be an expressway traffic accident or train derailment etc. and HEMS is utilised for the rapid transport of patient / injured to hospital. Such a mission will typically involve a speedy response of trained HEMS medical personnel to the scene of an accident/incident whereupon the treatment of the patient commences immediately and continues while the patient is rapidly transported to the nearest appropriate hospital.

(b) Secondary Response.

This is an indirect action wherein HEMS is directed to a designated site to rendezvous with GEMS ambulance to facilitate rapid on-carriage of a critical patient by helicopter to a hospital. In this form of response the initial patient care could be performed by GEMS and HEMS is employed to reduce the overall transfer time to a definitive care for critical medical cases. In this case HEMS is not the first responder at the scene and GEMS would usually assess and provide initial medical cover and call out for HEMS for time-sensitive patients. HEMS operations in secondary response scenarios should balance and optimise patient outcome vis-à-vis overall resource use. HEMS operations in primary and secondary role are referred to as pre-hospital care.

(c) Tertiary Response.

This form of utilisation is a planned urgent transfer of patients, or medical supplies requiring specialised care, or of medical personnel between hospitals. In such cases transfer journeys are deemed clinically excessive by road are therefore performed by helicopter. The transport is planned and the medical crew and equipment is ‘tailored’ to the specific needs of the patient to be transported. The helicopter is used in an air ambulance role and the transfer is usually initiated by the dispatching hospital in consultation with the specialist receiving hospital in accordance with appropriate clinical protocols. The tertiary response role is referred as inter-facility or inter-hospital transfer and such flights are almost always an air ambulance mission.

PART II – PREREQUISITES AND EQUIPAGE STANDARDS

9. HEMS CERTIFICATION REQUIREMENTS

9.1 An operator intending to utilise a helicopter for the purpose of HEMS shall obtain specific approval by DGCA for HEMS operations. To obtain such approval, the operator shall:-

(a) hold an Air Operators Certificate.

(b) limit utilisation of the helicopter exclusively for HEMS tasks.

(c) demonstrate cohesion and coordination of HEMS activities with local/state/national EMS structure.

(d) establish geographic area of operations of 60 nm radius from HEMS operating base.

(e) validate compliance with OpSpec requirements enumerated in this Operations Circular.

10. HELICOPTER EQUIPAGE REQUIREMENTS

10.1 The helicopter being utilised for HEMS shall comply with the following equipment requirements:-

(a) Category A multi-engine helicopter, for safety and capability to undertake performance class 1 or 2 operations over congested hostile terrain.

(b) IFR certificated, for operations in positively controlled environment thereby increasing safety.

(c) Helicopter Terrain Awareness and Warning Systems (HTAWS) with up to date terrain database for geographic area of operations for prevention of CFIT, obstacle strike accidents and risk mitigation for day/night operations. The equipment shall be in conformity to RTCA DO-309, Minimum Operational Performance Standards (MOPS) for Helicopter Terrain Awareness and Warning System (HTAWS) Airborne Equipment.

(d) Flight Recorder System with specifications applicable to lightweight flight recorders as specified in EUROCAE ED 155, Minimum Operational

Performance Specification (MOPS) consisting of aircraft data recording system (ADRS), cockpit audio recording system (CARS), airborne image recording system (AIRS) and/or a data link recording system (DLRS).

(e) Helicopter Usage Monitoring System (HUMS) capable of recording flight performance data for risk assessment to provide engine reliability statistics for alleviation when safe forced landing is not assured.

(f) Airborne weather radar, for safe operations in adverse weather conditions.

(g) Aircraft Tracking system which is a ground based process to maintain and update at standardised intervals, a record of the four dimensional position of the aircraft in flight so that aviation security and air traffic concerns can be mitigated.

(h) Wire Strike Protection System (WSPS) installation, for ensuring safety by reducing risks of an unseen potential wire entanglement in the HEMS operating site.

(i) In case of night operations, NVIS equipment and compatible lighting system for improving situational awareness (SA) at night and increasing safety in low altitude operations. The NVIS equipment shall be as far as practicable Generation III and must meet the requirements stipulated in RTCA DO-275 or TSO C164 and comply with the applicable instructions of continued airworthiness.

(j) In case of night operations, a fully trainable NVIS compliant searchlight operable by the pilot for identifying obstructions around HEMS operating site and illuminating the landing area.

(k) Integrated communication suite on the aircraft that enables voice communication between cockpit and ground EMS and also on police radio channels. Continuous communications cover shall also be available between the helicopter and HOCC on sat/VHF/GSM links which could be either/or be data/voice.

(l) EMS adapted interiors. The helicopter interiors should be as far as practicable EMS adapted with gapless panelling to prevent leakage of fluids into interior spaces with flame retardant moisture-resistant interior panels.

11. MEDICAL EQUIPAGE REQUIREMENTS

11.1 The environmental conditions for medical devices used in HEMS are different from those expected in a normal hospital environment. In particular, this implies environmental conditions such as temperature and humidity, vibration and shock caused by movement of the air ambulances, variable atmospheric pressures and electromagnetic disturbances between the air ambulances and the medical device.

11.2 Guidance for medical standards.

(a) The use and fitment of medical equipment in HEMS shall be guided by standards laid down in BS EN 13718-1:2008 Part 1: Requirements for medical devices used in air ambulances, and BS EN 13718-2:2008 Part 2: Operational and technical requirements of air ambulances.

(b) Onboard medical equipment including Medical Portable Electronic Devices (MPED) can cause serious potential electromagnetic interference with aircraft avionics, navigation, communications, flight or engine control systems. The electromagnetic emission and susceptibility of medical devices shall conform to ISO 7137 or RTCA DO-160D Sections 20 and 21. The operator must demonstrate that the medical equipage is electromagnetic compatible and EMC test report with source/victim matrix is established.

PART III – OPERATIONAL CRITERIA

12. HEMS ORGANISATIONAL REQUIREMENTS

12.1 Organisation Structure.

(a) HEMS is a specialised service that marries two critical activities of medicine and aviation. An appropriate governance model shall be implemented to provide oversight and management of the service.

(b) The organisation shall be headed on an operational level by an expert each from aviation and medicine, preferably at a Director level. This would ensure that adequate command and control mechanisms are built into the system with defined responsibilities and shared tasks that are steered by

respective operational heads. With disparate professions conjoined under a common umbrella, cohesion of efforts in HEMS operations is essential to meet expectations and maintain safety.

12.2 Establishment of HEMS Operational Control Centre (HOCC).

(a) The purpose of HOCC is to implement operational control procedures to provide risk assessment, preflight information dissemination, flight tracking, information conduit for operations and overall flight operations support.

(b) HOCC shall be established by the HEMS operator that may be located within the HEMS operating base or at remote location.

(c) One HOCC may be implemented by each operator for its entire HEMS fleet.

(d) HOCC compliance and guidance material are enumerated in Appendix I.

12.3 HEMS Operating Base Requirements.

(a) The operating base is the location from where all flight operations will commence and complete. There is a high probability of a large number of take-offs and landings from this location and for that reason no alleviation from operating procedures or performance rules are permitted.

(b) The operating base when located outside a licensed aerodrome or heliport and when used for day VFR only shall comply with landing area requirements as given in CAR Sec 4 Series B Part V – Minimum safety requirements for helicopter landing areas used on regular basis.

(c) The operating base when located outside a licensed aerodrome or heliport and when used for day/night, IFR/VFR shall comply with dimension and data quality requirements as given in CAR Sec 4 Series B Part III – Heliports.

(d) Every operating base shall have for obtaining current and forecast weather information and shall be provided with satisfactory communications with the appropriate air traffic services (ATS) unit alongwith full communication link with HOCC in case it is not co-located.

(e) Suitable infrastructural facilities should be created for housing operational support systems such as maintenance, stores, fuel etc. and crew support amenities as per guidance material at Appendix II.

13. HEMS OPERATIONAL REQUIREMENTS

13.1 The operational envelope for HEMS extends beyond air ambulance flights (which are limited to inter-hospital transfers only). It encompasses full flexibility response missions in primary, secondary and tertiary operational scenarios.

13.2 Minimum Crew.

(a) The minimum crew for HEMS operations shall be two pilots.

(b) This may be reduced to one pilot for air ambulance operation in tertiary response when operating to airfield/heliport.

13.3 Operating Minima.

(a) HEMS flights operated in performance class 1 and 2 shall comply with the weather minima as tabulated below for dispatch and en-route phase of the HEMS flight.

DAY MINIMA	
Ceiling	Visibility
300 ft – 599 ft	1500 m
> 600 ft	1000 m *
* During the dispatch and en-route phase visibility may be reduced to 800 m for short periods when in sight of land if the helicopter is manoeuvred at a speed that will give adequate opportunity to observe any obstacles in time to avoid a collision.	
NIGHT MINIMA	
Cloud Base	Visibility
1200 ft *	2500 m
* During the en-route phase, cloud base may be reduced to 1000 ft for short periods.	

(b) In the event that during the en-route phase the weather conditions fall below the cloud base or visibility minima shown, HEMS helicopter (which are certified for flights in instrument meteorological conditions) may abandon the flight, return to base or convert in all respects to a flight conducted under instrument flight rules (IFR), provided the flight crew are suitably qualified.

(c) The weather minima for the dispatch and en-route phase of a HEMS flight operated in performance class 3 shall be a cloud ceiling of 600 ft and a visibility of 1500 m. Visibility may be reduced to 800 m for short periods when in sight of land if the helicopter is manoeuvred at a speed that will give adequate opportunity to observe any obstacle and avoid a collision.

(d) In reduced visibility conditions for a short periods when in sight of land, the HEMS Commander shall evaluate the risk of flying temporarily into reduced visibility against the need to provide emergency medical service. He shall carefully assess if the aviation risk to third parties, the crew and the aircraft is proportionate to the task, and he shall abandon the task if considered otherwise. The following advisory speeds should be complied in reduced visibility conditions taking into account that the forward visibility should not be less than the distance travelled by the helicopter in 30 seconds so as to allow adequate opportunity to see and avoid obstacles.

REDUCED VISIBILITY SPEEDS	
Visibility (m)	Advisory Speed (kts)
800	50
1500	100
2000	120

13.4 Performance Requirements.

(a) Operations conducted over a hostile environment shall not be in performance class 3.

(b) Operations to/from a HEMS operating site that is located in a congested hostile environment could be in performance class 2 if specific approval is accorded after meeting compliance criteria specified in Appendix III.

(c) Operations to/from HEMS operating base located at elevated helipads and/or in congested hostile environment shall be in performance class 1.

13.5 HEMS Operating Site.

(a) This is the primary pick up site related to an incident or accident and consequently its use can never be pre-planned. It therefore attracts

alleviations from operating procedures and performance rules when appropriate.

(b) Types. The operating site or Landing Zone (LZ) could be either,

(i) Surveyed LZ – This is a LZ that has been reconnoitred by the HEMS operator and a general data set regarding size, obstructions, lighting, surfaces, wires etc. have been obtained. PIS would be an example of surveyed LZ.

(ii) Ad-hoc LZ – Does not satisfy the criteria of surveyed LZ and are expedient to a specific HEMS mission.

(c) Size. The minimum size of HEMS operating site is dependent upon D value which is the largest dimensions of the helicopter when its rotors are turning. The minimum size of LZ should conform to:-

(i) Day operations - 2D for both surveyed and ad-hoc LZ.

(ii) Night operations – 2D for surveyed LZ and for ad-hoc LZ, 4D in length and 2D in width.

(d) Performance. During operations from HEMS operating sites the helicopter mass should not exceed the maximum mass specified in the AFM for a climb gradient of 8% in still air at the appropriate take-off safety speed (V_{TOSS}) with the critical engine inoperative and the remaining engines operating at an appropriate power rating.

(e) LZ Directory. The operator shall maintain a directory of surveyed LZ within its geographic area of operations. This information should contain timely recording and identification of obstructions, ingress/egress factors and a reporting system for unsatisfactory or dangerous conditions.

13.6 Night Operations. Night operations shall be permitted if,

(a) the operator has been granted specific approval for night operations after meeting certification list criteria for night ops.

(b) the minimum equipment listed in Para 10.1 (c) – (j) are functioning and serviceable.

(c) the aircrew are meeting training and recency standards.

(d) weather and visibility criteria of Para 11.3 are met.

(e) HEMS operating site is a surveyed LZ.

13.7 Night Vision Imaging System (NVIS) Operations.

(a) HEMS helicopter shall only be operated under VFR at night with the aid of NVIS if the operator has obtained specific approval after demonstrating compliance with NVIS requirements and the integration of all its elements.

(b) Equipage Requirements.

(i) Each helicopter and all associated NVIS equipment shall have been issued with the relevant airworthiness approval.

(ii) Radio altimeter. The helicopter shall be equipped with a radio altimeter capable of emitting an audio warning below a pre-set height and an audio and visual warning at a height selectable by the pilot, instantly discernible during all phases of NVIS flight.

(iii) Aircraft NVIS compatible lighting. To mitigate the reduced peripheral vision cues and the need to enhance situational awareness, the following shall be provided:-

(aa) NVIS-compatible instrument panel flood-lighting, if installed, that can illuminate all essential flight instruments.

(bb) NVIS-compatible utility lights.

(cc) portable NVIS compatible flashlight.

(dd) a means for removing or extinguishing internal NVIS non-compatible lights.

(iv) Additional NVIS equipment. The following additional NVIS equipment shall be provided:-

(aa) a back-up or secondary power source for the night vision goggles (NVG).

(bb) a helmet with the appropriate NVG attachment.

(v) All required NVGs on an NVIS flight shall be of the same type, generation and model.

(vi) Continuing airworthiness. Procedures for continuing airworthiness shall contain the information necessary for carrying out

ongoing maintenance and inspections on NVIS equipment installed in the helicopter and shall cover, as a minimum:-

(aa) helicopter windscreens and transparencies.

(bb) NVIS lighting.

(cc) NVGs.

(dd) any additional equipment that supports NVIS operations.

(vii) Any subsequent modification or maintenance to the aircraft shall be in compliance with the NVIS airworthiness approval.

(c) NVIS operating minima.

(i) Operations shall not be conducted below the VFR weather minima.

(ii) The operator shall establish the minimum transition height from where a change to/from aided flight may be continued.

13.8 Helicopter Hoist Operations (HHO).

(a) HHO may be conducted by HEMS operator if if the operator has obtained specific approval after demonstrating compliance with HHO requirements and the integration of all its elements.

(b) Equipage Requirements.

(i) The installation of all helicopter hoist equipment and any subsequent modifications shall have an airworthiness approval appropriate to the intended function. Ancillary equipment shall be designed and tested to the appropriate standard as required by the competent authority.

(ii) Maintenance instructions for HHO equipment and systems shall be established by the operator in liaison with the manufacturer and included in the operator's helicopter maintenance programme

(c) Two-way radio communication shall be established with ground personnel at the HHO site for day/night operations.

(d) Helicopter performance during HHO for HEMS has no performance restrictions but the Commander should exercise considerations for minimising

exposure time and risk to HHO passenger and third parties on ground in case of critical engine failure.

(e) In situations that require HEMS at night from unsurveyed sites, Night HHO may be considered as an alternative.

(f) As part of risk analysis and management process the operator shall specify risks associated with the HHO environment and minimisation strategies in the operations manual by describing requirements of selection, composition and training of crews, and normal and likely abnormal operations.

(g) Where patient condition is feasible, HHO passengers shall have been briefed and made aware of the dangers of static electricity discharge and other HHO considerations.

13.9 Fuel Planning.

(a) When the HEMS mission is conducted under VFR within geographical area of operations, standard fuel planning can be employed provided the operator establishes final reserve fuel to ensure that, on completion of the mission the fuel remaining is not less than an amount of fuel sufficient for:-

(i) 30 minutes of flying time at normal cruising conditions, or

(ii) when operating within an area providing continuous and suitable precautionary landing sites, 20 minutes of flying time at normal cruising speed.

13.10 Hot Refuelling.

(a) When the commander considers refuelling with passengers on board to be necessary, it can be undertaken either rotors stopped or rotors turning provided the following requirements are met:

(i) doors on the refuelling side of the helicopter shall remain closed.

(ii) doors on the non-refuelling side of the helicopter shall remain open, weather permitting.

(iii) fire fighting facilities of the appropriate scale shall be positioned so as to be immediately available in the event of a fire.

(iv) sufficient personnel shall be immediately available to move patient clear of the helicopter in the event of a fire.

13.11 Load and Trim sheet Considerations.

(a) HEMS helicopter are permanently installed with specialised medical equipment and can also embark carry-on medical equipment. Large volume equipment such as isolettes and intra-aortic balloon pump (IABP) may not be installed and when carried would be treated as carry-on baggage to be properly secured and counted as payload.

(b) The load and trim sheet for HEMS mission shall be prepared for the commencement flight from operating base. Whilst actual weight for crew members and equipment shall be used, standard weights shall be used for the patient.

(c) Due to the nature of operations wherein the patient is embarked after launch from the operating base, the load of HEMS helicopter would normally increase except in cases where the embarked weight is offset by burnt fuel weight. If the helicopter weight exceeds from its commencement weight by 2%, another load and trim sheet for the new leg shall be prepared.

(d) The helicopter may be switched off at operating site to facilitate on-site stabilisation procedures and transfer of patient. In such an event this shall be counted as subsequent leg of HEMS flight and hence will not require fresh load and trim sheet provided weight exceedance if any, is within 2% tolerance.

13.12 Emplane/Deplane.

(a) The HEMS helicopter may be required to emplane/deplane medical supplies, equipment, crew or patient expeditiously which entails that the helicopter rotors could be turning. Such movements may be permitted if the operator specifies appropriate safe procedures for compliance in his Operations Manual.

13.13 Operational Veto.

(a) Any HEMS flight crew or technical crew member may exercise veto over HEMS tasking if he deems that the risk assessment is not proportionate to the task.

13.14 Dangerous Goods.

(a) Articles and substances which would otherwise be classified as dangerous goods shall be exempted from approval for HEMS flight when it is carried for the purpose of medical aid and to the extent specified in the Technical Instructions.

(b) This exemption shall be accorded if the operator can demonstrate procedures and compliance regarding the following:-

(i) Gas cylinders/canisters have been specifically designed for the purpose of containing a particular gas and its safe aerial transportation and dispensing.

(ii) Drugs, medicines and other medical matter are under the control of trained personnel during the time when they are in use in the helicopter.

(iii) Equipment containing batteries are secured and maintained in such a way so as to prevent spillage of the electrolyte or lead to overheat conditions.

(iv) Proper provision has been made to stow and secure all the medical equipment during take-off and landing and at all other times when deemed necessary by the HEMS Commander.

(v) Medical articles and substances intended as replenishments are transported in accordance with Technical Instructions.

14. MEDICAL OPERATIONAL REQUIREMENTS

14.1 Dispatch and Handoff Protocols.

(a) Guideline protocols for dispatch and usage of helicopter in HEMS duty shall be defined in the Medical Manual. It should enumerate conditions that require HEMS intervention and the triage process so as to diminish medical oversight variability and justify appropriateness in usage.

(b) Handoff is the transfer of information, responsibility, and authority from one provider to another in respect of the patient. Procedures for handoff from GEMS to HEMS or HEMS to hospital /vice-versa, should be detailed in the Medical Manual to prevent gaps in trauma care when the patient responsibility is shifted.

14.2 Patient Safety.

(a) Passenger briefing cards are required to be carried in HEMS helicopter and should document procedures for,

(i) the proper restraint of patient and passengers.

(ii) procedures for patient safety during HHO.

(iii) restraint measures for hysterical or combative patients.

(b) The requirement for safety briefing for patients shall be waived off in cases when medical condition of the patient makes it impracticable.

14.3 Infection and Biohazard Control.

(a) The operator shall establish procedures for infection and biohazard control and educate pilots, medical crewmembers and maintenance personnel in mitigating exposure to blood borne pathogens and biohazards.

(b) It is good practice to observe universal precautions and receive appropriate vaccinations prior to working on or around HEMS helicopter. Procedures should be established at operating bases for equipment cleaning and the disposal of biohazard materials.

14.4 Medical Equipment Installation and Removal.

(a) Medical equipment from the helicopter may be required to be removed or replaced due to items being expended, consumed or rendered unserviceable. If this operation is uncomplicated and does not require specialist tools, a person other than certified mechanic could be trained and authorised to remove or replace such equipment.

(b) In such cases the documented instructions and training procedures shall be included in the Operations Manual and Training Manual.

(c) The procedures for handling and securing of special medical equipment such as stretchers, isolettes, balloon pumps and ventilators should be documented in the Medical Manual.

14.5 Electrical Load Analysis.

(a) Electrical load analysis of installed and portable medical equipment shall be done and the data endorsed in the cockpit emergency check-off list

for load shedding planning in an electrical emergency that warrants such action in consultation with the medical crew.

PART IV – TRAINING AND CHECKING CRITERIA

15. HEMS FLIGHT CREW REQUIREMENTS

15.1 HEMS Experience Levels.

(a) Initial HEMS Training. Before undertaking HEMS operational flying, all pilots shall undergo initial HEMS training which shall conform to the AMC for HEMS Operational Training (HOT) placed at Appendix IV.

(b) Flight Experience. The experience level of the HEMS Commander conducting HEMS flight shall not be less than:-

(i) Either,

(aa) 2000 hours as pilot-in-command/commander on helicopters, or

(bb) 1000 hours as co-pilot in HEMS operations of which 500 hours are as pilot-in-command under supervision and 100 hours pilot-in-command/commander of helicopters.

(ii) 500 hours operating experience in helicopters gained in a similar operational environment, and

(iii) for pilots engaged in night operations, 100 hours of night as pilot-in-command/commander on helicopters.

(c) Pilots engaged in HEMS flight shall hold valid instrument rating.

15.2 Recency.

(a) For day operations, 30 min of day flying in HEMS role in last 3 months.

(b) For night operations, 2 hours of night flying in HEMS role in the last 3 months

15.3 Flight Recurrent Checks and Training.

(a) One proficiency check of minimum 45 min duration within the last 6 months on a non-HEMS flight or approved FSTD. If the operator has been granted approval for night operations, every alternate proficiency check shall be NVIS aided.

(b) One line check by day of minimum 30 min duration within the last 6 months on a HEMS flight.

(c) If the operator has been granted approval for night operations, one line check by night of minimum 30 min duration within the last 6 months on a HEMS flight.

(d) 30 min flight by sole reference to instruments in a helicopter or approved FSTD within the last 3 months.

(e) Critical Emergency training of 1.5 hours duration in an approved FSTD (or on the helicopter when no FSTD is available), within the last 12 months.

15.4 Ground Recurrent Checks.

(a) HOT for flight crew completed within the last 12 months.

(b) CRM training completed within the last 12 months.

(c) Emergency and Survival Training completed within the last 12 months.

(d) Dangerous Goods training completed within the last two years.

(e) In case of offshore HEMS, Helicopter Underwater Escape Training (HUET) completed within the last three years.

16. NVIS TRAINING REQUIREMENTS

16.1 A minimum experience of 100 hours of night flying as pilot-in-command/commander of a helicopter shall be required before commencing NVIS training.

16.2 The NVIS training and checking should be in conformity to the AMC - NVIS Training and Checking material placed at Appendix V and should be completed within the last 6 months.

16.3 Recency. All pilots and NVIS technical crew members conducting NVIS operations shall have completed 2 hours of NVIS flights in the last 3 months in the helicopter or an approved FSTD.

16.4 Checking. Frequency of NVIS checks shall follow the night recurrent schedule and could be combined with those checks.

17. HHO TRAINING REQUIREMENTS

17.1 HHO crew member shall complete HEMS specific HHO training in accordance with HHO procedures contained in the operations manual. The HHO training and checking should be in conformity to the AMC - HHO Training and Checking material placed at Appendix VI which shall be completed within last 6 months.

17.2 For night operations, HHO crew member shall complete all phases of NVIS ground training that is given to flight crew and be trained to operate around helicopter employing NVIS.

17.3 The minimum experience level for the commander conducting HHO flights shall not be less than:-

(a) 2000 hours as pilot-in-command/commander of helicopters.

(b) 100 hoist cycles, of which 20 cycles shall be at night if night operations are being conducted, where a hoist cycle means one down-and-up cycle of the hoist hook.

17.4 Recency. All pilots and HHO crew members conducting HHO shall have completed in the last 3 months,

(a) when operating by day, any combination of three day or night hoist cycles each of which shall include a transition to and from the hover.

(b) when operating by night, three night hoist cycles each of which shall include a transition to and from the hover.

17.5 Checking. HHO crew shall complete HOT within the last 12 months.

18. MEDICAL CREWMEMBER TRAINING

18.1 All medical crew members shall undertake HEMS Orientation Training (HOT) prior to being utilised in any HEMS flight. The purpose of HOT is to ensure familiarity with the HEMS working environment and equipment, operation of on-board medical and emergency equipment and participation in normal and emergency entry and exit procedures.

18.2 The guidance material on HOT for Medical Crewmembers is placed at Appendix VII. The valid frequency of this training shall be within the last 6 months. Medical Crewmembers shall be exempt from passenger briefing.

19. GROUND EMERGENCY SERVICE PERSONNEL TRAINING

19.1 GEMS personnel comprise EMS responders, law enforcement personnel and hospital staff who are an important facet for ensuring a safe environment during HEMS activity from the operating LZ. Due to the large dispersion of GEMS personnel, formalised training in HEMS aspects is not feasible for every individual. Therefore, HEMS operators shall take all reasonable measures to ensure that HOT for GEMS personnel is percolated to the majority by all conceivable means such as training pamphlets, training material on the operator's web site, peer group training methods etc.

19.2 The guidance material on HOT for GEMS personnel is placed at Appendix – VIII.

PART V – DOCUMENTATION CRITERIA

20. INFORMATION MANAGEMENT (IM) SYSTEM

20.1 The HEMS operator shall incorporate a robust Information Management (IM) system for performance monitoring and tracking operational efficiency. This is required because of higher costing per response by HEMS as compared to GEMS and performance information pertaining to efficiency and appropriateness of dispatch decisions should be available for review.

20.2 The system should be capable of generating reports that relate to the performance of the air medical and critical care system from call receipt time to the time the mission is completed in an automated and integrated fashion. The system should be capable of reporting missions by queries across multiple fields (e.g. date of service, location of mission, crew completing mission, aircraft type, patient demographic, etc.) to enable facilitated and complete reporting on case reviews for investigators and quality improvement purposes.

20.3 The IM data should have appropriate InfoSec policy due to patient confidentiality requirements with fail-safe redundancy standards and all past data should be preserved.

21. OPERATIONS MANUAL

21.1 The operations manual should include the following additional aspects:-

(a) HOCC duties and dispatch process flow.

(b) Guidance on take-off and landing procedures at ad-hoc LZ.

(c) Guidance for the selection of the HEMS operating site.

(d) Hazard map of the geographic area of operations.

(e) Procedures to be followed in case of inadvertent entry into cloud.

(f) Risk Analysis procedures, mitigation and management.

(g) Use of portable equipment on board.

(h) Fuel and oxygen replenishment procedures.

(i) Flight crew and medical crew training and checking.

(j) Equipment to be carried and its limitations.

(k) Minimum equipment list (MEL) entry covering the equipment specified.

(l) Communication procedures with HOCC, GEMS and medical crew.

(m) CRM training for aviation and medical crews.

21.2 On NVIS aspects, the Ops manual should contain:-

(a) selection and composition of crew.

(b) pre and post-flight procedures and documentation.

(c) crew coordination procedures, including:-

(i) flight briefing.

(ii) procedures when one crew member is wearing NVG and/or procedures when two or more crew members are wearing NVGs.

(iii) procedures for the transition to and from NVIS flight.

(iv) use of the radio altimeter on an NVIS flight.

(v) inadvertent instrument meteorological conditions (IIMC) and helicopter recovery procedures, including unusual attitude recovery procedures.

(d) in-flight procedures for assessing visibility, to ensure that operations are not conducted below the minima stipulated for non-assisted night VFR operations.

(i) weather minima for HEMS operation.

(j) the minimum transition heights to/from an NVIS flight.

21.3 On HHO aspects, the Ops manual should contain:-

(a) risks associated with the HHO.

(b) performance criteria.

(c) training of crews.

(d) levels of equipment and dispatch criteria.

(e) the criteria for determining the minimum size of the HHO site, operating procedures and minima.

(f) normal and likely abnormal operations and mitigation techniques.

(g) the method by which crew members record hoist cycles.

22. SECURITY PROGRAMME

22.1 The HEMS operator in his Security Manual shall specifically cover aspects regarding security of helicopter at HEMS operating sites and preventative security measures considering nature of HEMS operations.

23. FLIGHT DATA RECORDER

23.1 The FDR shall automatically start to record the data prior to the helicopter being capable of moving under its own power and shall stop automatically after the helicopter is incapable of moving under its own power. The FDR data recorded during at least the preceding 10 hours should be available.

23.2 The recording history should include data from aircraft data recording system (ADRS), cockpit audio recording system (CARS), airborne image recording system (AIRS) and/or a data link recording system (DLRS).

24. HOCC MANUAL

24.1 This should contain organisational instructions on assignment of duties to personnel, method of sourcing of data, dissemination of data, work process flow, risk management strategies and monitoring of events.

24.2 It should also contain procedures on shift-change, pre-flight briefings and use of technical tools.

25. HOCC RECORD

25.1 Events in HOCC should be recorded and be available for at least the preceding 3 days.

25.2 This shall include history of telephone messages, messages, data link records and all communication transcripts.

26. MEDICAL MANUAL

26.1 The medical manual should contain procedures and guidelines on:-

(a) Inventory of medical articles and substances, handling procedures and safety aspects shall be contained in the Medical Manual.

(b) The procedures for handling and securing of special medical equipment.

(c) Guideline protocols for dispatch and usage of helicopter in HEMS duty.

(d) Handoff procedures.

(e) Passenger safety.

(f) Infection and Biohazard Control.

(g) Selection criteria for medical crew and their training.

27. TRAINING MANUAL

27.1 The Training manual should contain syllabus, standards and frequency of training on:-

(a) HEMS flight crew training.

(b) HHO crew training.

(c) Medical crew training.

(d) HOCC personnel training.

(e) GEMS training.

(f) Collaborative CRM training with all elements as above.

Sd/-
(Capt Ajay Singh)
Chief Flight Operations Inspector
For Director General of Civil Aviation

APPENDIX I

GUIDANCE MATERIAL ON HEMS OPERATIONAL CONTROL CENTRE (HOCC)

1. Helicopters engaged in HEMS operate in a dynamic environment due to the technically challenging nature of HEMS flight operations and the time-critical nature of such operations. This positions HEMS with a heightened risk profile that can be sizeably diminished with enhanced operational control procedures by providing HEMS flight crew with critical information invaluable to flight safety decision process. This guidance material 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 HOCC and enhanced operational control processes in support of HEMS operations.

2. HEMS Operational Control Centre (HOCC) is a control organisation that shall coordinate and support flight operations by,

(a) assisting HEMS flight crew with risk analysis and navigation planning.

(b) organising, coordinating and disseminating flight information such as air traffic procedures, enroute weather, HEMS operating site report and route information.

(c) supervising progression of flight by flight tracking technology.

(d) monitoring dynamic flight considerations such as weather and fuel.

(e) acting as conduit for flow of information between the helicopter, government agencies and ground EMS agencies.

3. HOCC Personnel.

(a) HOCC Controller (‘Controller’) should be decidedly knowledgeable in aviation aspects with specific regard to HEMS and the types of helicopter that are operated. It is desirable that the Controller should be a helicopter pilot but any other experienced aviation personnel with sufficient aviation knowledge could also serve as the Controller. The Controller should be capable to plan, coordinate and support HEMS operations. The Controller is responsible to maintain a situational awareness of all considerations affecting operations.

(b) Communication Officer (‘Comms’) should be capable to support HEMS operations by relaying coordination information among the flight crew, EMS

personnel or any other involved parties. He supports the Controller in maintaining the operational plot of the situation.

(c) IT Support are individuals specifically trained to maintain and support the HOCCs technology infrastructure and may be employed in-house or outsourced.

4. HOCC Work Flow.

(a) The HOCC is the nerve centre for all HEMS operations by an operator. Accordingly, the HOCC should be manned by at least one Controller and assisted by one Comms during HEMS operational and standby periods.

(b) The request for HEMS could be received by Comms and is assessed by the Controller to check that dispatch protocols have been followed.

(c) The Controller prepares risk assessment and authorises the HEMS tasking.

(d) Risk assessment is reviewed and jointly concurred with HEMS Commander for HEMS mission acceptance.

(e) HOCC coordinates air traffic scheduling, supplementary flight information such as weather, route navigation and operating site considerations, and disseminates to HEMS flight crew.

(f) HOCC supervises and monitors helicopter activities from take-off to return.

(g) In a hub-spoke model, the HOCC (hub) will control different HEMS operating base Ops Room (spokes) in a similar work flow process.

5. HOCC Technology Design.

(a) The technical complexity of a HOCC is relative to the scale of operations but redundancy overlays should be incorporated for achieving fail-safe operations. This would include but not limited to the following hardware/software resources:-

(i) Reliable internet access.

(ii) Networking architecture within HOCC and between Ops Rooms.

(iii) Communication technology based on landline, mobile and satcom.

(iv) Datalink facility.

(v) Weather analysis tools.

(vi) Flight information systems.

(vii) Risk analysis software.

(viii) Aircraft tracking tools.

(ix) GIS presentations for tracking, weather and operating site data.

(b) The technology in HOCC is the foundation for controlling flight operations and consequently the impact of technology failure in the HOCC is a cause for alarm. It is therefore crucial to design system architecture such that failure of an equipment or technology enabler does not imperil operations. Plans for temporary or less-severe failures and outages along with severe technology failures should also be expected and prepared for in the HOCC IT disaster recovery plan.

6. Training.

(a) Presently there are no regulatory training requirements for HOCC Controller and it is preferred that Controller duties should be tasked with suitably experienced helicopter pilots who have knowledge of the area of operations, aircraft and operational scenarios. However, training programme for technical instructions on systems and communication procedures should be included in the HOCC Manual in addition to av iation elements such as risk management, CRM, ATC procedures and aircraft performance amongst others.

(b) There are also no regulatory training requirements presently for Comms but it is in good practice that he should possess an overview of aviation knowledge for supporting the Controller. He should also be given training on technical instructions on communication, control systems, dispatch process and the work flow progression.

(c) The operational control procedures in HOCC (and Ops Rooms if in hub-spoke hierarchy) shall be formalised to ensure consistent methodologies is applied in HEMS dispatch procedures. This would ensure that pertinent essential tasks are under surveillance especially during periods of high work load and abnormal operations.

APPENDIX II

GUIDANCE MATERIAL ON HEMS OPERATING BASE

INFRASTRUCTURAL REQUIREMENTS

1. The HEMS operating base is an establishment at an airfield or helipad from which HEMS helicopter and its crew members may be on stand-by for HEMS operations. All HEMS flight originate and end from this location.

2. It is therefore concomitant that the operating base should have operational support systems and facilities that enable and also sustain HEMS operations that are typified with long wait times and uncertainly timed short mission durations. If crew members are required to be on standby with a reaction time of more than 45 minutes, the provision of dedicated suitable accommodation would not be applicable.

3. The following is a guideline for infrastructural facilities to be made available in an operating base:-

(a) Maintenance hangar.

(b) Workshop and maintenance storage.

(c) Fuel storage and dispensation.

(d) General stores area.

(e) Medical equipment stores area.

(f) Flight planning area with briefing/ debriefing rooms.

(g) Operations Room linked with HOCC in cases when HOCC is not co-located.

(h) Air traffic control facilities when operating base is not co-located within airfield or heliport.

(i) Office area for resident flight crew, medical crew and maintenance crew.

(j) Suitable accommodation spaces for flight crew, medical crew and maintenance crew.

(k) Shower and washroom facilities.

(l) Kitchen/pantry facilities.

(m) Recreational facilities.

(n) Security barriers around operating base.

(o) Storm water management.

(p) Utilities connections including networking and communications facility.

(q) Parking area for helicopter and vehicles.

APPENDIX III

GUIDANCE MATERIAL ON OPERATIONS WITHOUT AN ASSURED SAFE FORCED LANDING CAPABILITY

1. Operations without an assured safe forced landing capability during the take-off and landing phases shall only be conducted if the operator has been granted a specific approval.

2. To obtain and maintain such approval the operator shall:-

(a) conduct a risk assessment specifying the type of helicopter, and the type of operations.

(b) implement the following set of conditions:-

(i) attain and maintain the helicopter/engine modification standard defined by the manufacturer.

(ii) conduct the preventive maintenance actions recommended by the helicopter or engine manufacturer.

(iii) include take-off and landing procedures in the operations manual, where they do not already exist in the AFM.

(iv) provide a system for reporting to the manufacturer loss of power, engine shutdown or engine failure events.

(v) specify training for flight crew.

(c) implement a usage monitoring system (UMS).

3. Engine Reliability Risk Assessment.

(a) As part of the risk assessment prior to granting an approval for operations without an assured safe forced landing capability during the take-off and landing phases, the operator should provide appropriate engine reliability statistics available for the helicopter type and the engine type.

(b) Except in the case of new engines, such data should show sudden power loss from the set of in-flight shutdown (IFSD) events not exceeding 1 per 100,000

engine hours in a 5 year moving window. However, a rate in excess of this value, but not exceeding 3 per 100,000 engine hours, may be accepted by the competent authority after an assessment showing an improving trend.

(c) New engines should be assessed on a case-by-case basis.

(d) After the initial assessment, updated statistics should be periodically reassessed and any adverse sustained trend will require an immediate evaluation to be accomplished by the operator in consultation with the competent authority and the manufacturers concerned. The evaluation may result in corrective action or operational restrictions being applied.

4. Determination of sudden in-service power loss rate.

(a) Sudden in-service power loss is an engine power loss that is:-

(i) larger than 30% of the take-off power,

(ii) occurring during operation, and

(iii) without the occurrence of an early intelligible warning to inform and give sufficient time for the pilot to take any appropriate action.

(b) Database documentation for each power loss event should be documented by the by the engine and/or helicopter Type Certificate Holder (TCH) as follows:-

(i) incident report number;

(ii) engine type;

(iii) engine serial number;

(iv) helicopter serial number;

(v) date;

(vi) event type (demanded IFSD, un-demanded IFSD);

(vii) presumed cause;

(viii) reference and assumed efficiency of the corrective actions that will have to be applied (if any), and

(ix) applicability factor when used.

(c) Applicability Factor is a form of counting methodology for counting engine power loss rate. The following is considered as acceptable for counting engine power loss rate:-

(i) Applicability factor is 0% for the following events which are not counted as engine in-service sudden power loss caused by,

(aa) unknown causes (wreckage not found or totally destroyed, undocumented or unproven statements).

(bb) where the engine or the elements of the engine installation have not been investigated (for example when the engine has not been returned by the customer).

(cc) an unsuitable or non-representative use (operation or maintenance) of the helicopter or the engine,

(ii) Applicability factor is 100% for the following events which are counted as engine in-service sudden power loss caused by,

(aa) the engine or the engine installation or

(bb) the engine or helicopter maintenance, when the applied maintenance was compliant with the maintenance manuals.

(iii) For the events where the engine or an element of the engine installation has been submitted for investigation but where this investigation subsequently failed to define a presumed cause, the applicability factor is 50%.

(d) The corrective actions made by the engine and helicopter manufacturers on the definition or maintenance of the engine or its installation may be defined as mandatory for specific operations. In this case the associated reliability improvement may be considered as a mitigating factor for the event. A factor defining the efficiency of the effective action may be applied to the applicability factor of the concerned event.

(e) Method of calculation of the powerplant power loss rate should be documented by engine or helicopter TCH and accepted by the relevant authority.

(f) The following documentation should be updated every year:-

(i) the document with detailed methodology and calculation as distributed to the authority of the State of design;

(ii) a summary document with results of computation as made available on request to any operational authority; and

(iii) a service letter establishing the eligibility for such operation and defining the corresponding required configuration as provided to the operators.

(g) The following sharing of roles between the helicopter and engine type certificate holders (TCH) should be maintained:-

(i) The provision of documents establishing the in-service sudden power loss rate for the helicopter/engine installation, the interface with the operational authority of the State of the operator should be the engine TCH or the helicopter TCH depending on the way they share the corresponding analysis work.

(ii) The engine TCH should provide the helicopter TCH with a document including: the list of in-service power loss events, the applicability factor for each event (if used), and the assumptions made on the efficiency of any corrective actions implemented (if used).

(iii) The engine or helicopter TCH should provide the operational authority of the State of the operator, with a document that details the calculation results taking into account the following:-

(aa) events caused by the engine and the events caused by the engine installation;

(bb) applicability factor for each event (if used), the assumptions made on the efficiency of any corrective actions implemented on the engine and on the helicopter (if used); and

(cc) calculation of the power plant power loss rate.

5. Implementation programme by operator.

(a) Attain and then maintain the helicopter/engine modification standard defined by the manufacturer that has been designated to enhance reliability during the take-off and landing phases.

(b) Conduct the preventive maintenance actions recommended by the helicopter or engine manufacturer as follows:-

(i) engine oil spectrometric and debris analysis, as appropriate.

(ii) engine trend monitoring, based on available power assurance checks.

(iii) engine vibration analysis (plus any other vibration monitoring systems where fitted).

(iv) oil consumption monitoring.

(c) The usage monitoring system should fulfil at least the following:-

(i) Recording of the following data:-

(aa) date and time of recording, or a reliable means of establishing these parameters;

(bb) amount of flight hours recorded during the day plus total flight time;

(cc) N1 (gas producer RPM) cycle count;

(dd) N2 (power turbine RPM) cycle count (if the engine features a free turbine);

(ee) turbine temperature exceedance: value, duration;

(ff) power-shaft torque exceedance: value, duration (if a torque sensor is fitted);

(gg) engine shafts speed exceedance: value, duration.

(ii) Data storage of the above parameters, if applicable, covering the maximum flight time in a day, and not less than 5 flight hours, with an appropriate sampling interval for each parameter.

(iii) The system should include a comprehensive self-test function with a malfunction indicator and a detection of power-off or sensor input disconnection.

(iv) A means should be available for downloading and analysis of the recorded parameters. Frequency of downloading should be sufficient to ensure data is not lost through over-writing.

(v) The analysis of parameters gathered by the usage monitoring system, the frequency of such analysis and subsequent maintenance actions should be described in the maintenance documentation.

(vi) The data should be stored in an acceptable form and accessible to the competent authority for at least 24 months.

(d) The training for flight crew should include the discussion, demonstration, use and practice of the techniques necessary to minimise the risks.

(e) Report to the manufacturer any loss of power control, engine shutdown (precautionary or otherwise) or engine failure for any cause (excluding simulation of engine failure during training). The content of each report should provide:

(i) date and time;

(ii) operator (and maintenance organisations where relevant);

(iii) type of helicopter and description of operations;

(iv) registration and serial number of airframe;

(v) engine type and serial number;

(vi) power unit modification standard where relevant to failure;

(vii) engine position;

(viii) symptoms leading up to the event;

(ix) circumstances of engine failure including phase of flight or ground operation;

(x) consequences of the event;

(xi) weather/environmental conditions;

(xii) reason for engine failure - if known;

(xiii) in case of an in-flight shutdown (IFSD), nature of the IFSD (demanded/un-demanded);

(xiv) procedure applied and any comment regarding engine restart potential;

(xv) engine hours and cycles (from new and last overhaul);

(xvi) airframe flight hours;

(xvii) rectification actions applied including, if any, component changes with part number and serial number of the removed equipment; and

(xviii) any other relevant information.

6. The parameters listed in Para 5 (c) may be capable of being incorporated and recorded in a newer technology full authority digital engine control (FADEC). In such a case the FADEC may partially, or in whole, fulfil the requirement for recording and storing parameters in a usage monitoring system.

APPENDIX IV

ACCEPTABLE MEANS OF COMPLIANCE ON HEMS OPERATIONAL TRAINING (HOT)

FOR FLIGHT CREW AND HHO CREW

1. Purpose. The purpose of HEMS Operational Training (HOT) for flight crew and HHO crew is to ensure that flight crew and HHO crew are familiar with HEMS operational aspects and knowledge of geographic area of operations. These guidelines shall be used for initial training and subsequent recurrent training.

2. Scope. The scope of training should include:-

(a) topographical familiarisation of the geographic area of operations.

(b) knowledge of the local airspace and air traffic facilities.

(c) local area meteorology training concentrating on the understanding and interpretation of available weather information.

(d) preparation of the helicopter and specialist medical equipment for subsequent HEMS departure.

(e) HEMS flight planning.

(f) factors for the assessment of suitability of HEMS operating sites.

(g) helicopter performance and landing/take-off profiles likely to be used at HEMS operating sites.

(h) HOCC interface and utilization.

(i) communication procedures with HOCC, GEMS and other agencies.

(j) knowledge of surveyed LZ.

(k) low level flight in poor weather.

(l) HTWAS operation and limitations.

(m) weather radar operation and limitations.

(n) NVIS operation and limitations, if applicable.

(o) the medical effects air transport may have on the patient.

(p) decision making training to emphasize that the medical condition of the patient should not be a factor in the Commander's decision to accept or decline a flight.

(q) techniques for handling patients, the medical consequences of air transport and some knowledge of hospital casualty reception.

3. Approval. HOT for flight crew and HHO crew shall be evaluated and specifically approved for inclusion in the operators Training Manual and should specify flight and ground training segments of instruction and checking.

APPENDIX V

ACCEPTABLE MEANS OF COMPLIANCE ON NVIS TRAINING AND CHECKING SYLLABUS

1. The flight crew and technical crew training syllabus should include the following:-

(a) NVIS working principles, aero-medical factors relating to the use of NVIS, eye physiology, vision at night, limitations and techniques to overcome these limitations.

(b) NVG performance and scene interpretation.

(c) preparation and testing of NVIS equipment.

(d) preparation of the helicopter for NVIS operations.

(e) normal and emergency procedures including all NVIS failure modes.

(f) maintenance of unaided night flying.

(g) crew coordination concept specific to NVIS operations.

(h) practice of the transition to and from NVG procedures.

(i) awareness of specific dangers relating to the operating environment.

(j) NVIS operations flight planning to include night terrain interpretation and factors affecting terrain interpretation.

(k) risk analysis, mitigation and management.

2. The flight crew checking syllabus should include:-

(a) night proficiency checks, including emergency procedures to be used on NVIS operations.

(b) line checks with special emphasis on the following:-

(i) local area meteorology.

(ii) NVIS flight planning.

(iii) NVIS in-flight procedures.

(iv) transitions to and from night vision goggles (NVG).

(v) normal NVIS procedures.

(vi) crew coordination specific to NVIS operations.

(c) Whenever the crew is required to also consist of an NVIS HHO crew member, he/she should be trained and checked in the following items:-

(i) NVIS working principles, eye physiology, vision at night, limitations, and techniques to overcome these limitations.

(ii) duties in the NVIS role, with and without NVGs.

(iii) the NVIS installation.

(iv) operation and use of the NVIS equipment.

(v) preparing the helicopter and specialist equipment for NVIS operations.

(vi) normal and emergency procedures.

(vii) crew coordination concepts specific to NVIS operations.

(viii) awareness of specific dangers relating to the operating environment.

(ix) risk analysis, mitigation and management.

APPENDIX VI

ACCEPTABLE MEANS OF COMPLIANCE ON HHO TRAINING AND CHECKING SYLLABUS

1. The flight crew training syllabus should include the following:-

   (a) fitting and use of the hoist.

   (b) preparing the helicopter and hoist equipment for HHO.

   (c) normal and emergency hoist procedures by day and, when required, by night.

   (d) crew coordination concepts specific to HHO.

   (e) practice of HHO procedures.

   (f) the dangers of static electricity discharge.

2. The flight crew checking syllabus should include:-

   (a) proficiency checks, which should include procedures likely to be used at HHO sites with special emphasis on:-

      (i) HHO flight planning.

      (ii) a transition to and from the hover at the HHO site.

      (iii) HHO departures.

      (iv) normal and simulated emergency HHO procedures.

      (v) crew coordination.

3. HHO technical crew members should be trained and checked in the following:-

   (a) duties in the HHO role.

   (b) fitting and use of the hoist.

   (c) operation of hoist equipment.

(d) preparing the helicopter and specialist equipment for HHO.

(e) normal and emergency procedures.

(f) crew coordination concepts specific to HHO.

(g) operation of inter-communication and radio equipment.

(h) knowledge of emergency hoist equipment.

(i) techniques for handling HHO passengers.

(j) effect of the movement of personnel on the centre of gravity and mass during HHO.

(k) effect of the movement of personnel on performance during normal and emergency flight conditions.

(l) techniques for guiding pilots over HHO sites.

(m) awareness of specific dangers relating to the operating environment.

(n) the dangers of static electricity discharge.

APPENDIX VII

GUIDANCE MATERIAL ON HEMS OPERATIONAL TRAINING (HOT)

FOR MEDICAL CREW MEMBER

1. Purpose. The purpose of HEMS Operational Training (HOT) for medical crewmembers is to ensure that the medical crewmember understands and is familiar with his role in the HEMS operation.

2. Scope. The scope of training should include:-

(a) familiarisation with the type of helicopter operated.

(b) In-flight emergencies and emergency landing procedures.

(c) entry and exit under normal and emergency conditions both for self and patients.

(d) loading/unloading and use of the relevant on-board specialist medical equipment.

(e) the need for the commander's approval prior to use of specialised equipment.

(f) lights, vents and power outlets.

(g) method of supervision of other medical staff .

(h) the use of helicopter inter-communication systems and portable sets.

(i) location and use of on board fire extinguishers.

(j) if operating by night, the differences between day and night operations.

(k) biohazard containment and infection control.

3. Approval. HOT for Medical crewmembers shall be evaluated and specifically approved for inclusion in the operators Training Manual.

APPENDIX VIII

GUIDANCE MATERIAL ON HEMS OPERATIONAL TRAINING (HOT)

FOR GEMS PERSONNEL

1. Purpose. The purpose of HOT for GEMS personnel is to instil awareness about HEMS operations and safety aspects amongst EMS responders, law enforcement personnel and hospital staff in HEMS operating site. The operator shall take all reasonable measures to ensure that ground emergency service personnel are familiar with the HEMS working environment and equipment and the risks associated with ground operations at HEMS operating site.

2. Scope. The ambit of awareness campaign should include:-

(a) suitability and evaluation of LZ.

(b) hazard/obstacle identification.

(c) communication and the use of basic hand signs for positioning and parking the helicopter.

(d) personal safety in and around the helicopter.

(e) loading/unloading of patient with with/without rotors running.

(f) in case of night operations, method of illuminating LZ.

(g) security against incursions and other hazards.

(h) disruptive/unruly crowd identification and control.

(i) evacuation procedure of helicopter occupants following an accident.

3. Approval. Methods for percolation of HOT for GEMS personnel shall be evaluated and specifically approved for inclusion in the operators Training Manual.