

Aviation Physiology Tech Support to High Altitude Airdrop Missions (HAAMS)

General Rules and Regulations: High Altitude Airdrop Mission Support.

Aug 2017

AV Phys Tech Support to High Altitude Airdrop Missions

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AV Phys Tech Support to High Altitude Airdrop Missions

ACRONYMS

1 CAD	1 Canadian Air Division
ALSE	Aircrew Life Support Equipment
AV Phys Tech	Aviation Physiology Technician
CFEME	Canadian Forces Environmental Medicine Establishment
CFSSAT	Canadian Forces School of Survival and Aeromedical Training
CANSOFCOM	Canadian Special Forces Command
DCS	Decompression Sickness
EP	Emergency Procedure
FL	Flight Level
HAAMS	High Altitude Airdrop Mission Support
HAP	High Altitude Parachutist
JM	Jump Master
LM	Load Master
OXCON	Oxygen Console
RCAF	Royal Canadian Air Force
SOP	Standard Operating Procedure

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Introduction

The most up to date version of this document is available from the 1 CAD Surg library: http://winnipeg.mil.ca/cms/Libraries/AE/AV_Phys_Tech_Support_to_High_Altitude_Airdrop_Missions_Aug_2017.sflb.ashx until it can be fully incorporated into higher level direction and guidance.

- 1. Purpose:** This document serves to provide a general overview of the Aviation Physiology Technician High Altitude Airdrop Mission Support (AV Phys Tech HAAMS). Aviation Physiology Technicians (AV Phys Techs) have provided in-flight physiological support to aircrew and parachutists performing unpressurized airdrop operations at 18 000' and above. Special Operations High Altitude Low Opening (HALO) / High Altitude High Opening (HAHO) personnel and equipment drops requires an AV Phys Tech HAAMS. Other missions that require exposure above 18 000' require consultation with the 1 CAD Surg to define an AV Phys Tech HAAMS requirement.
- 2. Background:** This program is still in its infancy, this document serves as the first attempt to establish roles and responsibilities of AV Phys Techs in support of High Altitude Airdrop Mission Support (HAAMS). The initial request for support began in 2008 and since then has gone through multiple revisions and evolutions. The intent is to provide operational support to the special operations community and RCAF fleets

Roles and Responsibilities: The AV Phys Tech Support to HAAMS program has 2 roles; AV Phys Tech HAAMS (CANSOFCOM), AV Phys Tech HAAMS (Dislocated):

- 3. AV Phys Tech HAAMS (CANSOFCOM):** The AV Phys HAAMS (CANSOFCOM) is posted to CANSOFCOM; they are tasked as the subject matter expert (SME) for High Altitude Oxygen equipment and are responsible for conducting and coordinating all 2nd and 3rd line maintenance to HAP Equipment. AV Phys HAAMS (CANSOFCOM) provides front end analysis for CANSOFCOM Training and missions in regards to HAAMS Support as well as coordinates with aircrew and all AV Phys Tech HAAMS. They conduct all incident tracking and reporting to CANSOFCOM and 1 CAD Surg office as well as maintain a lessons learned database. AV Phys HAAMS (CANSOFCOM) is responsible for all related lesson development, AV Phys Tech HAAMS Training and all levels maintenance of competency. They are responsible for all future capability development in regard to support and are the CANSOFCOM subject matter expert (SME) for High Altitude Parachutist Physiology and regulations. AV Phys HAAMS (CANSOFCOM) will deploy as needed for any immediate response.
- 4. AV Phys Tech HAAMS (Dislocated):** The AV Phys Tech HAAMS (Dislocated) are posted to either CFSSAT or CFEME. They brief aircrew and additional personnel prior to the first mission on physiological considerations, the importance of proper oxygen discipline, pre-breathing and other mission critical points as per the Aircrew Brief found in Annex C. They brief the aircraft commander and crew on use of oxygen equipment, depressurization schedules and pre-flight supplemental oxygen equipment. They advise and assist loadmasters in loading, positioning and securing mission specific oxygen equipment. The AV Phys Tech HAAMS (Dislocated) will be positioned in the A/C in order to monitor crew members, parachutists, additional personnel and

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Oxygen equipment. The AV Phys Tech HAAMS (Dislocated) will have access to the aircraft intercom system as required. They will monitor and record pre-breathing times and exposures at or above 16 000' to the maximum target altitude and back down to 10 000'. They advise the aircraft commander and jump master and manage the disposition of any in-flight or post-flight physiological incident until relieved by an appropriate higher medical authority. All physiological incidents will be reported to the AV Phys Tech HAAMS (CANSOFCOM). The AV Phys Tech HAAMS (Dislocated) will be responsible for all 1st line maintenance to High Altitude Oxygen Equipment. AV Phys Tech HAAMS (Dislocated) support is provided by CFSSAT/CFEME as per the signed Service Level Agreement (SLA)

Rules and Regulations

- 5. Employment:** One AV Phys Tech HAAMS is required for for SOF airdrop and when a pre-breathing console is used. They may be on board for any aircrew exposures above 18000' at the discretion of 1 CAD Surg. AV Phys Tech HAAMS are meant to work in teams of two in order to supplement ground operations and provide support to 19 or more parachutist personnel aboard the aircraft. For exposures above 13 000' it is strongly recommended that an AV Phys Tech HAAMS be present on board the aircraft to allow for training and mitigate risks. When supporting aircrew (without parachutists) one AV Phys Tech can support all personnel using the aircraft's narrow panel regulators (NPRs).
- 6. Oxygen Requirements:** All aircrew are required to have supplemental oxygen at or above 10 000' as per the aircraft SMM. Parachutists are required to have supplemental oxygen at 13 000' and above, this means that parachutists may ascend to altitude on bailout system alone for these jumps (bottle capacity dependent). At 18 000' both aircrew and parachutists must have supply to 100% oxygen. This means for parachutists; a pre-breathing console must be utilized to maintain oxygen discipline. AV Phys Tech HAAMS are required when a pre-breathing console is to be utilized. AV Phys Tech HAAMS are qualified to adjust aircrew ALSE as required to obtain a mask seal utilizing an NPR.
- 7. Pre-Breathing:** The AV Phys Tech HAAMS is responsible to brief, monitor and record all pre-breathing for both aircrew and parachutists in accordance with the direction and regulations at Annex A. The team lead will record all physiological incidents and altitude exposure times in the Aircrew/Parachutist exposure checklist found in Annex B of this document.

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High Altitude Airdrop Procedures

8. **Pre-Flight Procedures:** Prior to the mission the Advanced AV Phys Tech (CANSOFCOM) and the Advanced AV Phys Tech (Dislocated) must perform the following tasks:
 - i. **DCS Evac Plan:** The AV Phys Tech HAAMS (CANSOFCOM) will research and provide a DCS plan to all AV Phys Tech HAAMS during training/mission preparation; they will liaise with the nearest hyperbaric facility, identify facility requirements and define the window for their support. The AV Phys Tech HAAMS is not responsible planning ground evacuation of the casualty for treatment of DCS, but will liaise with any health services support personal to ensure a plan has been directed.
 - ii. **Oxygen Refilling:** The AV Phys Tech HAAMS (CANSOFCOM) will liaise with CAF/Contracted refilling support entities and ensure they are prepared for refilling bailout bottles and pre-breathing consoles for specific mission requirements, the Team lead will update these entities to any changes to the briefed plan.
 - iii. **Aircrew Briefings:** The Team lead will brief the aircraft commander on the specific pre-breathing schedule for that mission, physiological emergency procedures, re-pressurization schedules and post flight procedures. The team lead will request the aircraft ascent and descent rates in order to calculate the maximum exposure time.
 - iv. **JM Briefings:** The Team lead will brief the JM on the specific pre-breathing schedule for that mission, physiological emergency procedures, re-pressurization schedules and post-flight procedures. Using the aircraft ascent/descent rates the Team lead will brief the JM on their maximum exposure time as per Annex A. The Team lead will request information on seating and mission specific aircraft configuration in order to rig the oxygen equipment.
 - v. **Oxygen Equipment Setup:** The Team lead is directly responsible to configure the A/C with the pre-breathing console, hoses and emergency equipment in coordination with the loadmasters and IAW with the JM's instructions.
 - vi. **Oxygen Equipment Briefings:** The Team lead will review Aviation Physiology, Hypoxia/DCS Symptoms and Function of Oxygen equipment with all jumpers prior to each training evolution or mission.
 - vii. **Oxygen Equipment Issue:** The Team lead is responsible to verify functionality of all oxygen equipment. They are to issue and confirm fit with all parachutists personal and provide a briefing on the equipment use.
 - viii. **Daily Briefing:** The Team Lead will provide a daily briefing on mission specific pre-breathing schedules, maximum exposure times, parachutists' physiological readiness, in-flight emergencies and post-flight procedures. This briefing can be found in Annex C.
9. **In-flight Procedures:** The AV Phys Tech HAAMS will provide in-flight support to all parachutists, aircrew and equipment as follows:

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- i. **Connection to Pre-breathing Console:** The AV Phys Tech HAAMS will connect the parachutists the pre-breathing console, ensure the bailout bottle is on, and verify oxygen flow. The AV Phys Tech HAAMS is to direct mask donning and verify mask seal/connection.
- ii. **Aircrew Oxygen Equipment:** The Team lead will ensure that all aircrew have donned their ALSE conducted a mask seal check and have their regulators set at 100% Oxygen.
- iii. **Pre-Breathing:** The Team Lead will inform the aircraft commander when pre-breathing has begun and when it is complete. They will record this information on the Aircrew/Parachutist exposure checklist in Annex B. The AV Phys Tech HAAMS will monitor all parachutists and aircrew for physiological conditions during the pre-breathing schedule.
- iv. **In-Flight emergencies:** The AV Phys Tech HAAMS will monitor all parachutists, aircrew and oxygen equipment. They will provide support to parachutists and aircrew for any physiological incidents as per Annex C/D. The Team lead is responsible to update both the JM and Aircraft commander on disposition of any casualties.
- v. **Disconnection from the Pre-Breathing Console:** Prior to disconnection the AV Phys Tech HAAMS will visually inspect all bailout bottles to identify their status. The AV Phys Tech HAAMS will disconnect the parachutists from the pre-breathing console and provide hose management to ensure safe egress from the aircraft.
- vi. **Recording Exposure Times:** The Team lead will record jumper exposure times IAW with HALO/HAHO descent rates/profiles on the Aircrew/Parachutist exposure checklist in Annex B. The Team Lead will record Aircrew exposure times once the aircraft has descended below 10 000' on Annex B as well.

10. Post-Flight Procedures: The AV Phys Tech HAAMS will perform the following post-flight procedures:

- i. **Rigging the Aircraft:** The AV Phys Tech HAAMS will rig the aircraft for the next mission, remove any quarantined equipment and provide refill all pre-breathing consoles/bailout bottles.
- ii. **Post Flight Briefing:** The Team lead will provide a post-flight brief to all parachutists and aircrew regarding their current exposure times, next allowable profiles, post-flight physiological incidents and procedures. The Team lead will record physiological incidents on Aircrew/Parachutist exposure checklist in Annex B and report to the AV Phys Tech HAAMS (CANSOFCOM).

11. Incidents:

- i. **AV Phys Tech HAAMS (CANSOFCOM):** Will ensure all parachutist physiological incidents are briefed to CANSOFCOM and promulgated to the 1 CAD Surg. They will manage the testing of all equipment to include mask/bottle calibration and air samples. The AV Phys Tech HAAMS (CANSOFCOM) will provide immediate feedback

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to CANSOFCOM for continuation or cessation of training. The AV Phys Tech HAAMS (CANSOFCOM) will manage a lessons learned database for all parachutist physiological incidents

- ii. **AV Phys Tech HAAMS (Dislocated):** The Team lead will ensure that all parachutist physiological incidents are reported to the AV Phys Tech HAAMS (CANSOFCOM) as soon as possible. They will ensure all CANSOFCOM involved equipment is quarantined and shipped back to CANSOFCOM as soon as possible. The AV Phys Tech HAAMS will instruct all cessation of training until the AV Phys Tech HAAMS (CANSOFCOM) has been notified of the incident.
- iii. The AV Phys Tech HAAMS will assist with any RCAF flight safety investigation resulting from incidents during high altitude exposures when they are on board.

Training Requirements

12. Training Authority: CANSOFCOM is the training authority for all AV Phys Techs in respect to HAAMS. CANSOFCOM will maintain tracking for currencies and conduct all continuation training for qualified AV Phys Tech HAAMS.

13. AV Phys Tech HAAMS (CANSOFCOM): Minimum QL6A AV Phys Tech and qualified Senior Sgt/WO AV Phys Tech posted to CANSOFCOM.

14. AV Phys Tech HAAMS (Dislocated): Minimum AV Phys Tech QL5 (MCPL). Training to qualify an AV Phys Tech to HAAMS duties will be conducted by CANSOFCOM. Members will maintain a CSPA/USPA Class 'A' freefall parachutist rating funded by CANSOFCOM.

Currency Requirements

15. CANSOFCOM will conduct and track bi-annual personal readiness verifications (APRV) in conjunction with bi-annual continuation training.

16. AV Phys Tech HAAMS must complete bi-annual APRV's and continuation within 2 months of supporting any forecasted task.

17. AV Phys Tech HAAMS who have not conducted support to a training event or operation or continuation for a maximum of 2 years must receive re-currency training at CANSOFCOM.



LCol R.R, Hannah

Air Division Surgeon, 1 CAD HQ

31 July 17

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Annex A: Pre-Breathing Tables

Table 1: This pre-breathing table is the only table to be used by CAF personnel

Cabin Altitude	Pre-breathe (min)	Time/exposure (min)	Max accumulated time at altitude/24h (min)
10000-17999'	Supplemental oxygen	240	Unlimited
18000-24999'	30	60	110
25000-29999'	60	45	60
30000-34999'	90	30	30

- a. Cabin Altitude is what defines exposure times and pre-breathing requirements.
- b. Exposure times refer to the time between the start of decompression, and the end of recompression. Exposure begins when cabin altitude passes through 16 000' and ends when cabin altitude returns below 10 000'
- c. Pre-Breathing is not required for drops below 18 000' but oxygen supplementation is required above 10 000' for aircrew and above 13 000' for all jumpers (no supplemental oxygen for jumpers is required between 10-13 000' as long as the duration does not exceed 30 minutes)
- d. A 1hr stay at ground level (<10 000') is required between each exposure requiring pre-breathing.
- e. An AV Phys Tech HAAMS is mandatory for SOF airdrop and when a pre-breathing console is used. They may be on board for any aircrew exposures above 18000' at the discretion of 1 CAD Surg.
- f. There must be 1 AV Phys Tech for every 18 Parachutists
- g. The Team lead must provide the Canadian High Altitude Oxygen Support briefing to all personnel on board prior to commencing any jump above 18 000'
- h. In accordance with 1 Canadian Air Division Surgeon guidelines, a break greater than 5 mins in pre-breathing constitutes a failure in the schedule and it must be restarted.
- i. All pre-breathing must be conducted on 100% oxygen with a full face mask and be completed before the aircraft ascends through 18 000'.

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ANNEX C: Aircrew Briefing Guide

Mission Profile:

- *Confirm the following with the JM/Aircrew Commander:*
 - Aircraft ascent pressurized/unpressurized?
 - If pressurized wings/cabin attitudes?
 - Ascent/Depressurization rate calculations of 1500 fpm
 - Cabin to be re-pressurized to below 10,000 ft MSL immediately post ramp closure.
 - Mask up after in-flight dressing/Mask up on the ground?

- *Explain Profile Chart to include the following regulations:*
 - All Pre-Breathing to be conducted on 100% Oxygen with oro-facial mask
 - All Pre-Breathing must be complete prior to ascending through 16 000'
 - Exposure time begins at 16 000' and ends when descending through 10 000' for both Aircrew and Jumpers
 - Maximum exposure time for mission profile.
 - All Aircrew will conduct a mask seal check every time that the mask is donned and mask will not be removed once seal check has been completed. Ensure all members know how to conduct a mask seal check.
 - Explain jump profile for how many pods/highest pod/descent time.

- *Explain Mission Profile to include the following critical events:*
 - **Pre-Breathing**
 - AV Phys Tech will notify the Senior LM/Aircraft Commander when all jumpers are prepared to begin Pre-Breathing
 - Senior LM/Aircraft Commander will notify the AV Phys Tech when all Aircrew are ready to begin Pre-Breathing
 - AV Phys Tech will notify Senior LM/Aircraft Commander when Pre-Breathing has commenced
 - AV Phys Tech will notify the Senior LM/Aircraft Commander when Pre-Breathing is complete

 - **Aircraft Decompression**
 - Senior LM/Aircraft commander will notify the AV Phys Tech when A/C decompression has begun
 - Senior LM/Aircraft commander will notify the AV Phys Tech when A/C decompression is complete
 - Senior LM/Aircraft commander will notify the AV Phys Tech when cabin altitude crosses through 16 000' and AV Phys Tech will begin exposure timer

 - **Dispatch**
 - AV Phys Tech will inform the Aircraft Commander/Senior JM when exposure time has reached the decision point

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- **Re-pressurization:**
- The Senior LM/Aircraft Commander will notify the AMT when re-pressurization has commenced
- The Senior LM/Aircraft Commander will notify the AMT when cabin altitude is <10 000'

Physiological Incidents:

- Ear/Sinus Issues (Aircrew/Jumper): The AV Phys Tech is to be notified of all ear/sinus issues and will treat with corrective measure (slowed ascent/descent) or with medication. AV Phys Tech will notify the Senior JM/Aircraft Commander as per the disposition of jumper/aircrew member.
- Hypoxia (Jumper): If a jumper has an issue with hypoxia, they will extend their arm with "thumbs down" The AV Phys Tech will attend to the jumper, assess for signs and symptoms and treat with emergency oxygen. If hypoxia is resolved with 5 mins of onset, the jumper is clear to continue; if not then the AV Phys Tech will treat for DCS. All hypoxic incidents will be reported to the Aircraft Commander through the Senior Jump Master
- Hypoxia (Aircrew): Review S/S of Hypoxia. If an Aircrew member suspects hypoxia they are immediately place their NPR to EMERGENCY/100% OXYGEN and inform all crew of a physiological incident, the aircraft commander will follow AOI for Hypoxic Incidents
- DCS (Jumper): If the AV Phys Tech suspects DCS, they will immediately inform the Aircraft commander. The Jumper will be placed on emergency 100% oxygen via oro-facial mask and moved forward of the aircraft. DCS Plan as follows: *(DCS Plan is to be created with a primary/secondary chamber for the mission area, as well as a location for the staging area and major city centers en-route to target location)*
- DCS (Aircrew): Review S/S of 4 types of DCS. Emergency procedures as per jumper SOP's

Post Flight: (Exchange phone numbers to ensure that aircrew have a POC for any physiological incidents)

- Signs and Symptoms of DCS may arise 12-24 hours after exposure, all s/s are to be reported to the aircraft commander/AV Phys Tech who will refer them to Health Services
- Barotrauma is to be reported to the aircraft commander/AV Phys Tech who will refer them to Health Services
- Review S/S of Oxygen Ear, symptoms may last up to 24 hours after extended exposure to 100% oxygen, report any issues to the Aircraft Commander/AV Phys Tech who will refer them to Health Services

Incident Reporting:

- All physiological incidents regarding aircrew will be reported via Aircraft Commander through the normal flight safety chain
- All jumper physiological incidents inside the aircraft will be reported by the AV Phys Tech via the normal flight safety chain and CANSOFCOM.
- All jumper physiological incidents post exit will be reported to CANSOFCOM.

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ANNEX D: In-Flight Emergency Procedures:

Emergency	Protocol	Result
Pressure Equalization (Ascent)	<ol style="list-style-type: none"> 1. Indicated by thumbs down 2. Write down issue on whiteboard 3. Phys Tech to advise the fol: <ol style="list-style-type: none"> 1. Reduce Ascent rate 2. Vigorous nose blowing 3. Apply 2 sprays Dristan in each nostril 	<ol style="list-style-type: none"> 1. Issue cleared resume initial ascent rate 2. Issue continues descend/pressurize the a/c and inform FC/AC
Hypoxia (Altitude)	<ol style="list-style-type: none"> 1. Indicated by thumbs down 2. Press mask against face to ensure a seal (Universal sign of Hypoxia) 3. Phys Tech to apply 100% emergency oxygen via portable system, 4. Assess for jumper relayed systematic relief (SpO2 can be used as a tool) 	<ol style="list-style-type: none"> 1. If Sx are resolved < 5 mins, O2 equipment is replaced and cleared to jump 2. > 5 mins jumper is moved forward in A/C, Phys tech will follow DCS protocol 3. Any case of unconscious results in a cease in jumping 4. FC and AC are informed as per jumper disposition
Hypoxia (Stagnant) <i>(Will occur post A/C exit, to be followed by medical support)</i>	<ol style="list-style-type: none"> 1. Loosen straps 2. Apply HF O2 via NRB 3. Place in semi-prone position 4. Assess for recovery and perform neurological exam as LOC allows 	<ol style="list-style-type: none"> 1. Consult Higher medical authority for further jumper disposition
Hyperventilation	<ol style="list-style-type: none"> 1. Follow Hypoxia protocol 2. Assist in slowing ventilation 	<ol style="list-style-type: none"> 1. Follow Hypoxia Protocol
Decompression illness	<ol style="list-style-type: none"> 1. Indicated by thumbs down 2. Write down issue on whiteboard 3. Move Jumper or Aircrew member forward in the A/C 4. Remove mask and apply 100% emergency oxygen via portable system 5. Assess vital signs and conduct neuro exam q 5 min. 6. Place patient into sei-prone position and splint affected joints 7. Patient to remain on 100% O2 and be provided continuing care until handover to high medical authority 	<ol style="list-style-type: none"> 1. Provide patient disposition updates to FC and AC 2. AC to follow Phys Tech briefed guidelines for that specific mission plan 3. Phys Tech to provide patient handover with exposure times to high medical authority 4. Phys Tech to assist with hyperbaric treatment coordination <p><i>(Portable Emergency Hyperbaric Stretcher?)</i></p>
Unconscious Casualty	<ol style="list-style-type: none"> 1. Move the jumper/aircrew forward of the A/C if possible and apply 100% emergency oxygen via portable system 2. Assess vitals and utilize basic airways as required (OPA/NPA/LMA/BVM) 3. In the case of cardiac arrest Phys Tech will conduct CPR as AED is not carried on the A/C 4. Any case of unconsciousness results in a cease of jumping 	<ol style="list-style-type: none"> 1. Phys Tech to communicate patient disposition to FC/AC 2. AC to follow Phys Tech briefed guidelines for that specific mission plan 3. Phys Tech to provide patient handover with exposure times to high medical authority 4. Phys Tech to assist with hyperbaric treatment coordination