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# **Air Rescue Association of Canada**

## **Summary of Best Practices for Helicopter Class D Fixed Line Operations**

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**Air Rescue Association of Canada**

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## Summary of Best Practices for Helicopter Class D Fixed Line Operations

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## INTRODUCTION

This document is a draft as provided by the Air Rescue Association of Canada (ARAC) and is solely included as a reference for ARAC members.

This Document was developed November 30 to December 1, 2005 by a Best Practices Working Group comprised of a cross-section of “users” organizations and “operators” air carriers currently carrying out Helicopter Class D “Fixed Line” operations in Canada (see **Appendix 1: List of Attendees**) and is in **DRAFT FORMAT**. A COMMENTARY will be added for each section or relevant paragraphs outlining the background and intent of the “Best Practices” published by the Air Rescue Association of Canada.

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## DISCLAIMER

This document provides guidance to members of the Air Rescue Association of Canada (ARAC) wishing to establish or adopt a set of Operating Guidelines for Helicopter **Class D Fixed Line** Operations. This document is not intended to be all – inclusive, but only a guide. The Best Practice herein sets out in general principal the actions necessary when conducting operations in any type of terrain.

Every effort has been made to supply accurate and up to date information, however, the ARAC assumes no responsibility for the accuracy, adequacy, or completeness of any information presented within and is not responsible for any errors or omissions, or outcomes obtained from the use of such information. In the event of any conflict, discrepancy, error, or omission between the information presented in this manual and the applicable current provincial and/or federal health and safety regulation, the provisions in the provincial and/or federal regulation will prevail.

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The information in this publication is intended as a guide and does not provide the only acceptable method of dealing with the subjects contained herein. It is not a definitive guide to government regulations and does not release users of this document from their responsibilities under applicable legislation.

The ARAC assumes no liability in publishing the Best Practices. In each case, company or organization personnel should conduct their own due diligence by way of performing specific testing, research, development and implementation of individual methods of controls and should familiarize themselves with all applicable government regulations.

## **DEFINITIONS/GLOSSARY**

### **CARs – Canadian Aviation Regulations**

Regulations respecting aviation and activities relating to aeronautics as set out by Transport Canada

### **CASS – Commercial Air Service Standards**

The standards published under the authority of the Minister of Transport that apply with respect to commercial air services operated by air operators.

### **Class D Fixed Line operation**

The technique used in the carriage of human external cargo (HEC) while suspended on an approved fixed or static line attached to a helicopter, and generally means a short distance to be traveled while a HEC load is being carried between geographical points.

### **HEC - Human External Cargo**

A person carried external to an aircraft.

### **Helicopter Class D external load**

An external load with a person carried externally, or any external load other than a Class A, B or C external load.

### **HETS – Helicopter External Transport System**

A fixed static line and attachment system for the carriage of human external cargo approved by Transport Canada Civil Aviation under a Supplementary Type Certificate issued to Bellis Investments Ltd. Dba Emergco Technical Solutions.

### **LZ – Landing Zone**

A helicopter landing area.

### **Medevac**

Helicopter transportation of a sick or injured person from the field to a medical facility.

### **MoT – Minister of Transport**

Member of Parliament assigned to the post of Cabinet Minister in the Transport Portfolio.

### **PCDS - Personnel Carrying Device System**

The entire Class D load carrying system, including the device(s) for attaching the load to the helicopter, suspension lines, harnesses, patient carrying devices, and all other items as specifically approved by Transport Canada (Airworthiness) for the operational configuration of the aircraft being operated.

**Radio Mandatory HETS Operation**

Where the Pilot cannot maintain a vertical reference and must rely on direction provided by a Class D Fixed Line practitioner who is either being carried on the Fixed Line system or who is directing the pilot from the ground, the operation shall be referred to as a Radio Mandatory Class D Fixed Line Operation.

**Staging area**

The landing zone (LZ) that is closest to the mission site where the helicopter can safely execute a full landing and shut down.

**STC- Supplemental Type Certificate**

A document that is issued by the Minister of Transport (MoT) to record the approval of a change to the original type design of an aeronautical product and that references the documents and data defining the change and the limitations and conditions applicable as a result of the change. The STC approves not only the modification but also how that modification affects the original design.

**TCCA – Transport Canada Civil Aviation**

The regulatory body of the Canadian Aerospace industry.

**Vertical Reference**

A flight evolution in which the pilot controls the attitude and motion of the helicopter by observing stationary objects beneath the helicopter, and in the case of a long-line sling load, manoeuvres the helicopter and controls the sling load by using the long-line sling cable/rope and ground directly below the helicopter as a primary source of hover reference. It is a highly demanding flight regime.

## **PILOT QUALIFICATION, TRAINING AND TESTING**

### **Qualifications**

- CARS/CASS requirements
- Pilot minimum (2000 hrs and 200 in type of initial assignment and then 25 hrs on types used subsequently)
- Mountain training for the operational area
- 1000 hrs. experience in the environmental area
- Current and proficient in long line operations
- Personal suitability

### **Training (Initial & Annual)**

- Ground school must comply with the User's Operating Guidelines (OGs)
- Familiar with CARS/CASS
- Training to point where competent to pass the flight test
- Emergency procedure training
- Perform a real-time simulation
- Familiar with the Company (Air Carrier) Operations Manual for Class D Operations
- Familiar with Flight Manual Supplement (FMS) for Class D Fixed Line equipment to be utilized for Aircraft to be used
- Demonstrate proficiency in installation and rigging of the aircraft
- Written Exam

### **Testing**

- Test with minimum 50 ft. line
- Bucket Slinging / Barrel Test (3 Barrel Drop Zones X 3 circuits in 6 minutes and a maximum of 3 minutes per circuit)
- General flying in the operational area with check pilot and one or two rescuers (technicians)
- Demonstrate precision and safety during human external load placement in real time simulation

## **PILOT QUALIFICATION, TRAINING AND TESTING CONT**

### **Examination Team**

Examination conducted by examination team approved by both parties (User and Air Carrier):

#### **Check Pilot**

Qualified 5 yrs minimum in Class D Fixed Line Operations plus current annual training.

#### **Rescuer (Technician)**

Qualified 5 yrs minimum as Rescue Leader (Mission Leader) in Class D Fixed Line Operations plus current annual training.

Has participated recently as an Observer or 2<sup>nd</sup> Evaluator on a previous pilot evaluation for Class D Fixed Line Operations and has carried out a pilot evaluation while being monitored by a qualified Rescue Leader (Mission leader) Class D Pilot Examiner.

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## **CLASS D FIXED LINE TECHNICIAN TRAINING AND TESTING**

Candidates must:

- Meet the criteria of the representative agency (User organization)
- Be available for response
- Be familiar and competent in the environment they will be working in

**NOTE:** User organization should only train the number of personnel needed to staff a crew. Number is based on a needs analysis.

### **Scope Of Initial Training**

- Helicopter safety
- Regulations – CARS/CASS and applicable Occupational Health & Safety Regulations i.e. Provincial OH&S or Federal OH&S
- User's Operating Guidelines (O.G.s)
- Personal preparedness/philosophy
- Anatomy of a mission
- Human Factors training comprising of; Situational awareness, Crew Resource Management, Mission (Aviation) Decision Making
- Equipment orientation/inspection/servicing/maintenance/documentation
- Aircraft configuration
- Demonstrate proficiency in installation and rigging of the aircraft
- Crewmember responsibilities
- Emergency procedures and responsible duties (i.e. Release of Bellyband)
- Initial training flights (i.e. solo/screamer/ARP portion to be conducted in terrain representative of the operating environment the User Organization may normally encounter)
- Real time scenario/simulation
- Written Exam

### **Scope Of Recurrent Training**

- Real time simulations
- Review of any new/previous 12 month period (include review of all incidents worldwide)
- Review of Equipment, Documentation, MOU (Written Agreement) and Operating Guidelines.
- Review of equipment/documentation must be complete/maintained/available for examination/preserved for 3 years

## CLASS D FIXED LINE TECHNICIAN TRAINING AND TESTING CONT

### Frequency Of Training

- Initial training will cover the scope of initial training
- One day recurrence training will be a minimum of once annually or more frequently to maintain proficiency
- Organizations must have a continued professional development program (Details TBA)
- Advanced training (future) annually or more frequently to maintain proficiency

### Competency

Candidate must demonstrate:

- Familiarity with equipment/aircraft/techniques
- Competency in the use of equipment and procedures

*NOTE: It is recommended that all rescuers (technicians) attend annual re-currency to share their experiences.*

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## EQUIPMENT STORAGE MAINTENANCE, INSPECTION AND RECORD KEEPING

User groups will have documentation that covers the following:

### Equipment Storage

- Equipment must be securely stored in an appropriate designated area separate from other operational equipment
- Equipment logs shall be available with kit

### Maintenance And Inspection

- Equipment will be maintained in an operational condition
- Equipment shall be inspected by a qualified Class D fixed Line technician after each use prior to storage
- A means of tracking equipment expiry shall be in place
- Time expired or damaged equipment shall be tagged out and quarantined

### Record Keeping

- User groups will designate personnel to be responsible for record keeping in compliance with Operating Guidelines. *NOTE: Mandatory requirement in accordance with CARs.*
- The Mission Leader is responsible for completing mission reports and equipment logs including equipment cycles
- All records shall be available to the user organization and operator

## **USER GROUP/AIR CARRIER INTERFACE**

- Memoranda of Understanding (MOU) or other written agreement such as a contract, which meets the requirements of the CARS and CASS shall exist between the air carrier and user group.
- The MOU/agreement shall be reviewed annually by the air carrier and user organization.
- The MOU/agreement will specify an understanding that the owner of equipment is responsible for inspection, maintenance, storage, and record keeping.
- MOU/agreement will contain a glossary of terms and commonly used acronyms.
- If a MOU/agreement does not exist between a user organization and an air carrier then operations shall not proceed and mutual aid/outside resources must be activated.

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## **OPERATIONS GUIDELINES**

User groups will have documentation that covers the following:

### **Mission Statement**

#### **Scope of work**

- The outline of work (rescue? Wildland firefighting? Utility insertion / extraction?)
- Rescue call – (swift water technicians, mountain rescue technicians)
- Medical calls

#### **Administration**

- Outline of organizational structure
- Duties and responsibilities
- Documentation distribution and amendments

#### **Risk Analysis / Management Section**

#### **Personnel Section**

- Qualifications
- Personal protective equipment

#### **Training Section**

- Requirements
- Documentation

#### **Operational guidelines**

- Operational procedures to be conducted i.e. Class D Fixed Line / Hover Exit / Hover Entry / Advanced procedures
- General helicopter training
- Communications protocol, flight following, radio procedures other i.e. over-water procedures

#### **Equipment**

- Certification
- Continuing airworthiness
- Documentation / records

#### **Quality assurance**

- Schedules (internal & external) and documentation / independent audit

## **OPERATIONS GUIDELINES FOR CLASS D FIXED LINE OPERATION**

All Class D Fixed Line operations will include the following stages

- Reconnaissance flight
- Plan (mission/rescue)
- Rig aircraft
- Pre mission briefing
- Safety check
- Mission flight
- Post mission debriefing
- Documentation

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## PREPLANNING

### Pre plan goals:

- To achieve an effective timeline
- To maintain operational integrity

Each organization must create a pre-plan specific to their operations for events or circumstances that are likely to occur including:

- Identify specific needs / scenarios
- Identify immediate resources / assets
- Additional resources / mutual aid
- Emergency procedures and back up plans
- Effective risk / benefit analysis
- Clear leadership / command structure

Include first flight plan

The operational pre-plan should be reviewed annually and received as required.

The pre-plan should be available to everyone identified in the pre-plan and a copy should be available at the normal base of operations.

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## PERSONNEL SAFETY STRATEGY

The following are key elements personnel safety strategy:

- Head / eye / ear protection suitable to the assigned task
- Personal protective clothing that is suitable for the environment and weather conditions
- Sufficient supplies and equipment for self evacuation and survival on site

### **Survival strategy**

Mental and physical suitability for the assigned task including survival on site or self evacuation

### **Pre plan**

List of recommended PPE / survival training for range of expected or potential tasks within response area

### **Accident procedure??**

SAR for SAR planning

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## COMMUNICATIONS

GPS and communications radios should be pre-programmed prior to flight and / ideally programmed in flight by a non-flying crewmember.

### Communications

- Reliable radio communications between rescuer (technician) and base
- Radio power conservation strategy
- Agreed upon hand signals between the pilot and rescuer (technician)
- Reliable and redundant systems for communication between rescuer (technician) / pilot / base

### Flight following

- A system of flight following shall be in place and the report / SAR trigger time will be adjusted as appropriate

### Traffic separation

- Where traffic separation: AM is primary, FM is secondary
- Where required the air safety controller should conduct communications on the AM radio on the appropriate designated frequency.

### Radio silence

- General use radio frequency – general restriction of communications during operation
- Radio silence during critical flight manoeuvres (slinging)
- Intercom restriction during critical manoeuvres

## ADVANCED PROCEDURES

**Definition:** When pilot visual reference may become difficult, then the operation is considered an Advanced Procedure.

Extraordinary situations require highly experienced pilots and rescuers (technicians). Training programs should be developed in anticipation of special circumstances.

### Primary Issues:

- Questionable Communications
- Circumstances when visual reference with the Human External Cargo (HEC) could be doubtful (difficult)

### Procedures/Training

Before deciding to carry out Advanced Procedures, all personnel must have received proper Advanced Training.

Special consideration above and beyond regular training must be given to circumstances involving:

- Swift (moving) water
- Large body of water without horizontal reference
- Low visibility issues
- Pilot direction via radio
- Extended long-line operations
- Remote directed (blind) insertion/extraction
- High angle pick-offs (i.e. cliff bands, structures)

## QUALITY ASSURANCE PROGRAM

### Vision statement (mission statement)

All organizations should have an audit process in place

### Purpose

To ensure that best practices are followed

### Process

A third party QA review process may be requested by a user group (response organization), a response organization's client or a local Municipal, Provincial or Federal Funding / Tasking Agency i.e. PEP in British Columbia for SAR Groups, Oil and Gas Company for a Medical & Safety Services provider, etc. The QA process will include:

- Review of documents compared to best practices
- Identification of deficiencies
- Ranking of deficiencies in critical and non-critical categories
- Corrective actions required (immediate, short-term & long-term)
- Audit report filed with the requesting user group management, ARA

### Consequence Of Findings:

#### ⇒ For British Columbia Provincial Emergency Program (PEP) Groups

- QA will be made against organization's documents
- QA Audit determines:
  - Critical finding(s)
  - Non-critical finding(s)
- Non-critical findings = ASE issued for Class D fixed line
- Critical findings = ASE for Class D fixed line denied

#### ⇒ For non-PEP organizations / companies

- QA will be made against organization's documents
- QA Audit determines:
  - Critical finding(s)
  - Non-critical finding(s)
- Reports are available to insurance companies and potential clients.

### Qualification of auditors

- ARAC approves auditors
- Related professional experience
- Audit training (or experience)

**Ethics**

- Auditors need to be independent and selected from a list of qualified auditors
- Auditors must have no conflict of interest
- Auditors involved in PEP organizations may not audit PEP clients
- Auditors involved in a specific industry may not audit industrial clients involved in same industry

**Frequency**

- Internal - Annual
- External (Independent 3rd Party) an initial external audit within 6 to 9 months and then every 3 yrs.

**Cost**

- \$1500 to \$2500 (3rd party estimated cost)

**Liability**

- May be contingent on audit process

**Examples of Organizations having in place a 3<sup>rd</sup> Party Audit Process**

- BC Heli Ski and Snow Cat Operators
- Canadian Business Aircraft Association
- Canadian Sport Parachute Association

## PILOT CRITERIA TRAINING AND TESTING REVIEW

### Check pilots

- Large company = Internal pilot acceptable
- Small company = External pilot

### Testing criteria (See ARA Pilot Criteria & Testing Procedures)

The following are the recommended revisions to the ARA Pilot Criteria & Test Procedure dated October 15, 2003 Rev D.

- Switch order of Phase 1 and Phase 2
- Phase 1 - Long Lining Test
- Phase 2 - General Mountain Flying check
- Phase 1 - Bucket Sling / Barrel Test is mandatory
- Phase 1 – Long Line Slalom and Vertical Reference (Hover) tests are optional

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## APPENDIX 1: LIST OF ATTENDEES

Lance Cooper	Alpine Helicopters Ltd.
Andrew Bradley	Blackcomb Helicopters Ltd.
Steve Flynn	Blackcomb Helicopters Ltd.
Andrew Morrison	Chilliwack Search & Rescue
Jason Simon	Emergco Technical Solutions
Pierre Forand	FLYINC.CA
Mike Neale	GVRD - Protection Sector
Roland Totzauer	GVRD - Protection Sector
Bruce Brink	Intrawest (Blackcomb Ski Patrol)
Wayne Flann	Intrawest (Blackcomb Ski Patrol)
Al Craft	Kootenay Heli Rescue Society
Joe Vingo	Kootenay Heli Rescue Society
George Zilahi	North Shore Rescue Team (Emergco)
Gord Irwin	Parks Canada
Marc Ledwidge	Parks Canada
Patrice Belle Rose	Pemberton Helicopters Ltd.
Perry Beckham	Squamish Search & Rescue
Ronn Palley	Talon Helicopters Ltd.
Brad Fandrich	Valley Helicopters Ltd.
Daryl Kincaid	Whistler Search & Rescue
Todd Cooper	Yellowhead Helicopters Ltd.

# **AIR RESCUE ASSOCIATION OF CANADA**

## **HELICOPTER CLASS “D” FIXED LINE OPERATIONS**

### **PILOT CRITERIA & TEST PROCEDURE**

#### **1. INTRODUCTION**

*Human External Cargo* (HEC) Helicopter Class “D” Fixed Line (longline) operations requires helicopter pilots who can provide a high degree of safety, reliability, integrity, and stability of operation while flying in mountainous terrain. Pilots are required to have the knowledge, ability and personal suitability in mountain flying, vertical reference work, and incident response (rescue) situations. This type of flying involves working in close cooperation with skilled incident response (rescue) personnel, and requires pilots to have the ability to work effectively as a member of a team.

#### **2. PILOT PRE-REQUISITES**

- Minimum of 2000 hours rotary wing flight time
- Minimum of 200 hours flight time on aircraft type (Initial)
- Minimum 1000 hours in operational area (i.e. mountainous terrain)
- Completed an approved mountain flying course
- Extensive mountain flying experience
- Current and proficient in long-line/vertical reference operations

#### **3. TEST PROCEDURE**

The test consists of flying under the direction of a designated examiner(s) meeting the approval of both the operator & user, either in the helicopter or on the ground.

The test is divided into three phases and sub-divided into a number of components. At each stage the pilot will be advised of the objectives of the component by the examiner(s). Throughout the test the pilot must communicate verbally with the examiner(s) concerning the reasons for all his control actions and decisions, and any pertinent observations he is making as pilot-in-command in response to the conditions or hazards affecting the operation.

#### **4. MARKING SYSTEM**

Pilots will be marked on a 1 to 4 scale.

- 4 - Excellent; Pilot meets and exceeds objective.
  - 3 - Good; Pilot meets the objectives.
  - 2 - Fair; Pilot does not meet the objectives efficiently, but does not compromise the safety of the aircraft and crew.
  - 1 - Fail; Pilot does not meet the objectives and/or compromises the safety of the aircraft and/or crew.
- Examiners may use increments of .5 (half a mark).
  - Pilots must achieve a three (3) average with no failures in any component of the test.
  - Examiners should be fully familiar with the objectives of each part of the test as outlined in Section 6.
  - Failures should be accompanied by clear explanations.

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## 5. TEST PHASE

The test is divided into three phases;

**Phase 1** - concerns long lining/vertical reference operations and is a test of the pilot's ability to handle typical long lining requirements in mountainous terrain. This phase also includes accuracy and speed test to judge the pilot's long lining precision and efficiency.

**Phase 2** - consists of general mountain flying similar to the type of flying encountered during searches and aerial surveys. Landing conditions are included in this phase to simulate the requirement to place crews in mountainous terrain.

**Note:** This Phase can be waived if the **User** has had extensive experience working with the pilot being examined during mountain flying operations including personnel placement in mountainous terrain (i.e. hover exit/entry, mountain landings, etc).

**Phase 3** - is a test under actual HEC operational conditions. The pilot will be required to perform personnel placement utilizing the "**Sling Rescue**" method, and may be required to perform other manoeuvres such as glacier and soft snow landings, broken ground/off-level landings, and hover exits or entry evolution.

In addition the pilot will be asked to propose strategies to meet operational objectives.

## 6. TEST COMPONENTS

The test will be concerned with but **not limited** exclusively to the following subject components:

### Phase 1: LONG LINING

#### 1.1 BUCKET SLINGING / BARREL TEST

**Description:** The pilot will be required to perform a number of manoeuvres using either the 55-foot or 105 foot long line. The following sequence of tests will be performed **3 times** and each sequence must be completed within **3 minutes**. The total of the testing components must be completed within **6 minutes**.

1. Place a 100 lb. to 200 lb. (45 kg. To 91 kg.) load on an elevated 1.2 meter (4 ft X 4 ft) square platform (e.g. plywood or pallet on fuel drums), so the load rests securely on the platform;
2. Place the load onto the top of a 45 gallon fuel drum so the load sits securely by its own weight; and
3. Place the load inside an open 45-gallon fuel drum and remove it. The drum will have a sandbag inside to partially stabilize it.

**Note:** *The test circuit for the above sequences should be set-up so that there is a distance of at least 50 ft. between each drop zone.*

**Location:** Low elevation field/open area with moderate winds.

**Objective:** This test demands precision and skill and often generates stress on candidate. Observe whether the pilot's performance improves or deteriorates as it progresses. Observe how he recovers from difficulties.

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## **1.2 SLINGING - MOUNTAINSIDE**

**Description:** Using either the 55 ft or 105 ft long-line with a 100 lb. To 200 lb. (45 kg. to 90 kg.) load (bucket or similar load) attached, the designated examiner will identify various hypothetical victim locations. The pilot will be asked to choose a suitable location in the same vicinity for delivery of a rescuer and then carry out the simulated delivery.

**Note:** Designated examiner is on board.

**Location:** Steep broken mountain face with various vegetation communities.

**Objective:** To assess the pilot's awareness of "sling rescue" techniques and its limitations, pilot's assessment and evaluation of sites and judgement.

**Note:** The site does not necessarily have to be flat enough to accept the load. Simulate delivery of a rescuer by touching the ground with the load.

## **OPTIONAL PHASE 1 TEST COMPONENTS**

The following are Optional Phase 1 Test Components that the Examining Team may require the pilot candidate being tested to perform.

## **1.3 VERTICAL REFERENCE WITH EXTERNAL LOAD**

**Description:** Using either a 55 ft. or 105 ft. long line (standard HEC long-line lengths) pick-up an approximate 100 lb. to 200 lb. (45 kg. To 91 kg) Load - i.e. log or drum and hover with the load in a vertical position about **1 to 2 meters** over a target circle of **2 meter diameter**. Pilot will hold hover for **two minutes**.

**Location:** On open ground away from trees, which could be used for vertical reference.

**Objective:** To observe the pilot's depth perception. Observe the amount of movement of the helicopter itself as well as the movement of the external load.

**Note:** The pilot's reaction to any wind if present.

## **1.4 LONG LINE SLALOM WITH EXTERNAL LOAD**

**Description:** With the same load, fly at hover speed along a road confined by trees or a similar course keeping the load not greater than 2 meters above the surface.

**Location:** Forested road, runway/taxiway marked by lines, or set-up a slalom course using high visibility cones to be used as perimeter markers.

**Objective:** Ability to control loads and handles stress of an unusual and precise form of long lining.

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## **Phase 2: GENERAL MOUNTAIN FLYING**

The pilot must be completely familiar with and demonstrate good to excellent ability to perform all necessary manoeuvres associated with the following terrain types:

Ridge tops, saddles, cirques, steep terrain including mountain faces and gullies, canyons, shoulders, forests, and water;

## **Phase 3: RESCUE**

The pilot will be required to perform a number of realistic simulations in a variety of mountainous terrain including locations at higher altitude; locations may involve glaciations, snowfields, or anywhere a rescuer may be required. This phase involves actual use of the "Sling Rescue" (HEC) methods.

**Description:** The pilot will deliver rescuers to a series of typical rescue sites using either the 55 ft or 105 ft. long -line.

**Location:** Precipitous mountain terrain.

**Objective:** The pilot should be able to adequately recognize sites, observe for hazards, carryout a power check, etc. Pilot should adequately relocate the sites after clear instructions from rescuers. The rescuers must be delivered and retrieved by a smooth direct flight path.

The missions include delivery of individual rescuers to rescue sites, then re-placement of rescuers on alternative sites, and then retrieval of two rescuers to the staging landing zone (LZ) locations. One flight should include transport of a litter containing a hypothetical victim and attendant.