BRITISH COLUMBIA

February 22, 2013
Ref: 489503

Deputy Commissioner Craig Callens, Commanding Officer, RCMP "E" Division
Chief Constables of Independent Municipal Police Departments
Chief Officer, SCBCTA Police Services
Chief Officer, Stl'atl'imx Tribal Police Services
Superintendent Denis Boucher, OIC, "E" Division Traffic Services
(for distribution to all BC RCMP Detachments and IRSU Units)
Chairs of Municipal Police Boards

RE: Use of Unmanned Aerial Vehicles (UAVs)

I understand some British Columbia police agencies have acquired or, plan to acquire, UAV technology in the near future.

Police Services Division is in the process of assessing the deployment of this technology, and compliance with Transport Canada regulations and provincial and/or federal privacy legislation. Therefore, I request that the following information be provided to my office:

1) A copy of your respective agencies policy/procedures;
2) A copy of the Privacy Impact Assessment or verification that consultation has taken place with the provincial and/or federal privacy commissioners' office, as appropriate; and,
3) Documentation related to compliance with Transport Canada regulations.

Thank you in advance for your cooperation on this important issue. Please forward the requested information to Mr. Rob Ferrier, Senior Program Manager, Police Services Division, as follows:

Mr. Rob Ferrier
Police Services Division
PO Box 9285 Stn Prov Govt
Victoria BC V8W 9J7
E-mail: Rob.Ferrier@gov.bc.ca

Yours truly,

Clayton J.D. Pecknold
Assistant Deputy Minister
and Director of Police Services
Policing and Security Branch

pc: Mr. Rob Ferrier

MacLeod, Peggy JAG:EX

From: Brita Wood [administration@nelsonpolice.ca]
Sent: Thursday, February 28, 2013 8:55 AM
To: Ferrier, Rob L JAG:EX
Cc: XT:Holland, Wayne LCLB:IN
Subject: Use of unmanned Aerial Vehicles

Mr. Ferrier:

In response to ADM Pecknold's request for information regarding the use of UAV's, this is to advise that the Nelson Police Department has no plans to utilize UAV's and as a result, we have no policy to forward to you.

Thank you.

Best regards,

Brita Wood

Executive Assistant
Office of Wayne Holland, Chief Constable
Nelson Police Department
606 Stanley Street
Nelson, B.C. V1L 1N4
Phone: 250.505.5653 Fax: 250.354.4179
administration@nelsonpolice.ca

MacLeod, Peggy JAG:EX

From: SG Policing and Security Programs Branch SG:EX
Sent: Monday, March 4, 2013 12:52 PM
To: Ferrier, Rob L JAG:EX
Subject: FW: Use of Unmanned Aerial Vehicles (UAVs) - 489503
Attachments: 489503.pdf

From: NEWMAN, Glenn [mailto:glenn.newman@vpd.ca]
Sent: Monday, March 4, 2013 12:23 PM
To: SG Policing and Security Programs Branch SG:EX
Subject: FW: Use of Unmanned Aerial Vehicles (UAVs) - 489503

Dear Mr. Pecknold,

At the present time, the Vancouver Police Department does not use unmanned aerial vehicles and as such, has no corresponding policy. Should this change in the future, we will forward you all the requested documentation.

Respectfully,

Glenn Newman
Inspector 1202
Executive Officer
Office of the Chief Constable
604-717-3498

From: SG Policing and Security Programs Branch SG:EX [mailto:SGPSPB@gov.bc.ca]
Sent: Wednesday, February 27, 2013 11:36 AM
To: 'Craig.Callens@rcmp-grc.gc.ca'; 'bobrich@abbypd.ca'; XT:Hames, Paul CSPD LCLB:IN; 'jcessford@deltapolice.ca'; XT:Holland, Wayne LCLB:IN; XT:Jones, Dave LCLB:IN; 'mfisher@oakbaypolice.org'; 'crattenbury@portmoodypolice.com'; XT:Chadwick, Mike LCLB:IN; CHU, Jim; XT:Graham, Jaimie LCLB:IN; XT:Lepine, Peter LCLB:IN; 'Deborah.Doss-Cody@rcmp-grc.gc.ca'; 'Neil.Dubord@transitpolice.bc.ca'; 'Denis.Boucher@rcmp-grc.gc.ca'; 'mayor@abbotsford.ca'; 'alastair.bryson@csaanich.ca'; 'mayor@corp.delta.bc.ca'; 'mayor@nelson.ca'; 'wwright@newwestcity.ca'; 'mayor@oakbay.ca'; 'mclay@portmoody.ca'; 'mayor@saanich.ca'; Robertson, Gregor; 'dfortin@victoria.ca'; 'msmith@westvancouver.ca'; 'mark.reder@fleishman.ca'
Cc: Ferrier, Rob L JAG:EX
Subject: Use of Unmanned Aerial Vehicles (UAVs) - 489503

Good morning,

Please see the attached letter from Mr. Clayton Pecknold, Assistant Deputy Minister and Director of Police Services, Policing and Security Branch, Ministry of Justice, for your attention.

Thank you,

Policing and Security Branch
Ministry of Justice
PO Box 9285, Stn Prov Govt
Victoria BC V8W 9J7
389459

MacLeod, Peggy JAG:EX

From: Mahon, Collette [collette.mahon@vicpd.ca]
Sent: Wednesday, February 27, 2013 2:52 PM
To: Ferrier, Rob L JAG:EX
Subject: FW: Use of Unmanned Aerial Vehicles (UAVs) - 489503
Attachments: 489503.pdf

Hello Rob,

As per Deputy Chief Del Manak, the Victoria Police department does not have any policy related to UAVs because we have not acquired or plan to acquire this technology.

Thank you.

Collette Mahon
Executive Assistant to the Chief Constable
Victoria Police Department
850 Caledonia Ave
Victoria, BC V8T 5J8
t. 250.995.7217
f. 250.384.1362
s.15, s.16
collette.mahon@vicpd.ca

From: SG Policing and Security Programs Branch SG:EX [mailto:SGPSPB@gov.bc.ca]
Sent: Wednesday, February 27, 2013 11:36 AM
To: 'Craig.Callens@rcmp-grc.gc.ca'; 'bobrich@abbypd.ca'; XT:Hames, Paul CSPD LCLB:IN; 'jcessford@deltapolice.ca'; XT:Holland, Wayne LCLB:IN; XT:Jones, Dave LCLB:IN; 'mfisher@oakbaypolice.org'; 'crattenbury@portmoodypolice.com'; XT:Chadwick, Mike LCLB:IN; 'Jim.Chu@vpd.ca'; Graham, Jamie; XT:Lepine, Peter LCLB:IN; 'Deborah.Doss-Cody@rcmp-grc.gc.ca'; 'Neil.Dubord@transitpolice.bc.ca'; 'Denis.Boucher@rcmp-grc.gc.ca'; 'mayor@abbotsford.ca'; 'alastair.bryson@csaanich.ca'; 'mayor@corp.delta.bc.ca'; 'mayor@nelson.ca'; 'wwright@newwestcity.ca'; 'mayor@oakbay.ca'; 'mclay@portmoody.ca'; 'mayor@saanich.ca'; 'gregor.robertson@vancouver.ca'; 'dfortin@victoria.ca'; 'msmith@westvancouver.ca'; 'mark.reder@fleishman.ca'
Cc: Ferrier, Rob L JAG:EX
Subject: Use of Unmanned Aerial Vehicles (UAVs) - 489503

Good morning,

Please see the attached letter from Mr. Clayton Pecknold, Assistant Deputy Minister and Director of Police Services, Policing and Security Branch, Ministry of Justice, for your attention.

Thank you,

Policing and Security Branch
Ministry of Justice
PO Box 9285, Stn Prov Govt
Victoria BC V8W 9J7
389459

MacLeod, Peggy JAG:EX

From: Denis Boucher [Denis.Boucher@rcmp-grc.gc.ca]
Sent: Friday, February 22, 2013 1:51 PM
To: MacLeod, Sam JAG:EX
Cc: Ferrier, Rob L JAG:EX; Randy BECK
Subject: Re: UAV's
Attachments: RCMP SFOC_Final.pdf; _E_ OM 25.104. Unmanned Aerial Vehicles (UAV).pdf; Unmanned Air Vehicle.docx

Sam,

Attached is our policy document,application for use and information pulled off of the transport Canada website.

>>> "MacLeod, Sam JAG:EX" <Sam.MacLeod@gov.bc.ca> 2013-02-12 11:12 >>>
Denis

We are preparing a Briefing Note for Clayton on this issue as it has been raised in the media and we expect it to get more play. Randy advised that you are working on a submission to the Privacy Commissioner and I think what we are missing from our note is the requirements/restrictions from Nav Canada.

I understand you are away this week but if you could provide any information you think is pertinent to our briefing – it would be much appreciated.

Sam

Sam MacLeod
Executive Director
Policing, Security and Law Enforcement Operations
Ministry of Justice
Ph 250-387-1387 or s.17 (cell)

Transport Canada

Special Flight Operations Certificate Application

Attn: Inspector Jason Rule / Superintendent Dave Dixon
620-800 Burrard Street
Vancouver BC, V6Z 2J8

Date of Application: 2011-January-29

In accordance with sections 602.41 and 623.65 of the Canadian Air Regulations, consideration is requested for an annual "standing" SFOC related to the development and operational use of an Unmanned Aerial Vehicle System by the Royal Canadian Mounted Police in British Columbia.

A. Applicant:

Royal Canadian Mounted Police, (Lower Mainland Integrated Collision Analysis and Reconstruction Service).

Mailing Address:
12992-76th Avenue
Surrey, BC
V3W 2V6

Physical Address:
7485-130th Street
Surrey, BC

Telephone: 604-598-4500

B. Operations Manager:

Cpl. Dave Jewers
12992-76th Ave
Surrey, BC
V3W 2V6

Contact Numbers:
a) 604-598-4500 (business)
s.15, s.16
d) 604-598-5639 (fax)

C. Deputy Operations Manager:

Cst. James Jenkins
12992-76th Ave
Surrey, BC
V3W 2V6

Contact Numbers:
a) 604-598-4500 (business)
s.15, s.16
c) 604-598-5639 (fax)

D. Method of Contact for during operation:

Cpl. Dave Jewers (Cell):
Cst. James Jenkins (Cell) s.15, s.16

Alternate contact number:

RCMP E-Division Federal OCC (Operational Communications Centre)

s.15, s.16 *(note: this is an unpublished number/not for outside disclosure)*

E. Type/Purpose of Operations:

1. Operational flights to obtain digital aerial images and video to support investigations of serious collision and major crime scenes/incidents at unspecified locations within the Province of British Columbia.
2. Flight testing, maintenance flights, flight training and demonstration flights.

F. Operation Date/Time:

1. Due to the operational requirements, this application is being made for a standing SFOC, renewable on an annual basis, as the ministry deems appropriate.
    i. Operational times:
        a. Due to the nature of emergency responses required of a police agency, operations as specified, open and ongoing, 24 hours a day. Night operations of this nature would be restricted to altitudes of no more than 100 feet above ground level. Non daylight operations would only proceed where there is sufficient ambient light or illumination for safe operations, including unaided visual contact with the aircraft. At all times of operation, the navigation lights shall be kept illuminated.

G. UAV Specifications:

1. **General System Information:**
    a. Draganflyer X6 Unmanned Aerial Vehicle (helicopter)
    b. The X6 UAV System consists of a control transmitter, base station and the aerial vehicle itself.

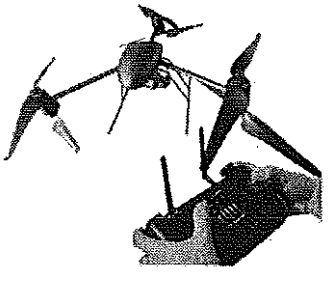


Fig.1: Draganflyer X6 and Control Transmitter

UAV Specifications (continued)

2. **UAV Manufacturer:**

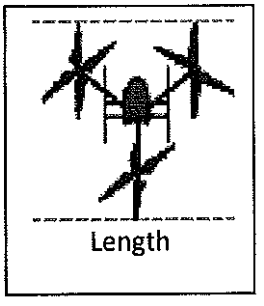
   Draganflyer Innovations Inc.
   2108 St. George Ave.
   Saskatoon, SK
   Phone: 1-800-979-9794
   www.draganfly.com

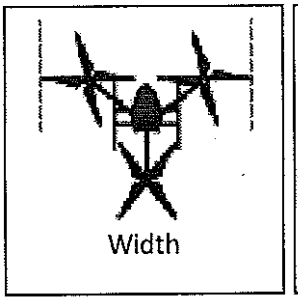
3. **General Description of Aircraft:**
   a. The X6 consists of the following main components:
      i. Center pod- contains the Vehicle Control Unit and Navigation Control Unit
      ii. Three motor arms- each motor arm houses two counter-rotating motors
      iii. Detachable battery pack
      iv. Interchangeable payload unit
      v. Fixed landing gear

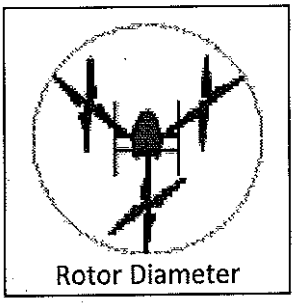
4. **Category:**
   a. Vertical take-off and landing (VTOL) UAV.

5. **Construction materials:**
   a. The airframe structure is comprised of composite carbon fibre and moulded plastic. Other components are constructed of glass-filled injected nylon with aluminum and stainless-steel fasteners (all materials are RoHS compliant).

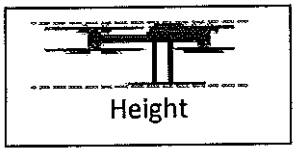
6. **Primary Specifications:**
   a. Length: 85 cm
   b. Width: 91 cm
   c. Height: 25.4 cm
   d. Rotor diameter:
      a) Upper: 40 cm
      b) Lower: 38 cm


Length


Width


Rotor Diameter

   e. Airframe weight: 1000 grams
   f. Maximum Payload: 500 grams
   g. Maximum gross take-off weight: 1500 grams


Height

UAV Specifications (continued)

7. **Operating Requirements:**

Operating temperature:	-10° to 40° C (14° - 104°F)
Relative humidity:	0%-90% non-condensing
Maximum wind speed:	30 km/h (18 mph)

8. **Flight characteristics/Performance:**

Cruise speed:	3 m/s (10 km/h)
Maximum speed:	14 m/s (50 km/h)
Minimum speed:	0 m/s (0 km/h)
Turn rate:	90 degrees/second
Maximum climb rate:	7 m/s
Maximum descent rate:	4 m/s
Maximum flight time:	25 minutes
Maximum range:	1 km
Maximum altitude:	640 m (2,100 ft)
Launch type:	VTOL (vertical take-off and landing)

9. **Detailed Specifications:**

   a. **Propulsion System:**

   Powered by a high efficiency Lithium Polymer battery system, the vehicle operates on six independent counter-rotating brushless, gearless electric powered rotors. Movement is accomplished by independently varying power to the individual rotor motors. The motor rotors are the only moving parts on the vehicle, minimizing the possibility of in-flight mechanical failure.

   b. **Rotor blades:**

   Three counter rotating pairs (six total) comprised of molded carbon fiber. Upper rotors measure 40 centimeters in diameter and weigh 12 grams each. The lower rotors are smaller, measuring 38 centimeters in diameter and weighing 11 grams.

   c. **Electric Motors:**

   The six brushless motors are mounted in a direct-drive configuration (one for each rotor). Each 38 gram motor contains 2 ball bearings and has stall-protection safety features. Each 14.8 volt motor draws 15.4 watts (92.4 watts total for the helicopter) with a peak total helicopter draw of 450 watts. The motors operate at 2,000 RPM at hover.

UAV Specifications (continued)

d. Position Navigation Lights:

The UAV is equipped with 1-watt variable-brightness LED lights positioned on the outboard engine pods in the standard full-size aircraft configuration (Left=red, right=green, tail=white). These high-intensity lights are visible in direct sunlight and provide both orientation assistance to the pilot and a collision avoidance feature.

e. On-board computer systems:

The vehicle's onboard processors performs the following functions:

a) Monitors all 11 stabilization sensors.
b) Monitors battery.
c) Controls motor speeds.
d) Controls the vehicle's attitude.
e) Controls the vehicle's position.

f. Landing gear:

Installed height: 18 cm
Stance width: 30 cm
Skid length: 30 cm
Material: molded carbon fiber

g. Helicopter battery:

Cell chemistry: Lithium power
Voltage: 14.8 volts (nominal)
Capacity: 2600 mAh
Cell configuration: 4s2P (4-series 2 parallel)
Connectors: Integrated balance and power
Recharge time: 30 minutes (after typical flight)
Length: 7.5 cm
Width: 6.7 cm
Height: 2.7 cm
Weight: 228 g

h. Controller/Transmitter:

Width: 22 cm
Height: 12 cm
Depth: 8 cm
Weight: 790 g

UAV Specifications (continued)

10. Data Link:

a. In-flight control is provided by a custom designed 2.4 GHz digital spectrum modulation (DSM) transmitter in conjunction with 11 on board stabilization sensors, onboard processor and an automated "GPS hold" function. This two-way data link technology meets all CE, FCC, IC and ETSI standards.

b. Digital Spectrum Modulation (DSM) is a proprietary method of implementing 2.4 GHz spread spectrum technology for the R/C industry. DSM divides the 2.4 GHz band into 80 individual channels (frequencies) and incorporates direct sequence spread spectrum with an imbedded GUID (Globally Unique identifier) code.

c. DSM technology meets FCC requirements, approved by the Radio Advisory Board of Canada in conjunction with the Model Aeronautics Association of Canada.

d. This system meets FCC requirements for a collision avoidance system that prevents the system from transmitting on an already occupied frequency.

e. Video Data Link is a one-way 5.8 GHz system with 7 selectable channels. The data link also provides a live camera view from the on-board camera system.

f. Other Communications Information:
   i. Helicopter antenna: Wired whip antenna.
   ii. Controller antenna: Omni-directional
   iii. Transmission power: 100 mW (+20dBm)
   iv. RF Data Rate: 250 Kbps
   v. Receiver sensitivity: -100dBm
   vi. Transmission Technique: DSSS (Direct Sequence Spread Spectrum)
   vii. Frequency band: 2.4000-2.4835 GHz

g. Video link Information:
   i. 5.8 GHz wireless
   ii. Helicopter to Ground (one way)
   iii. Transmitter Antenna: Omni-directional
   iv. Receiver Antennas: Omni-Directional & Flat Patch
   v. Transmission Power: 12 dBm
   vi. Transmitter Power Consumption: 500 mW
   vii. NTSC and PAL Compatible
   viii. 7 Selectable channels: 5740 MHz, 5760 MHz, 5780 MHz, 5800 MHz, 5820 MHz, 5840 MHz, 5860 MHz

11. GPS :

Used for position hold, location and velocity data.
Maximum satellites tracked simultaneously: 16

Position update rate:	4 Hz
GPS Antenna:	Ceramic patch
Battery backup:	Lithium polymer

UAV Specifications (continued)

12. Onboard Sensors:

3 solid state MEMS (micro-electro mechanical systems) Gyros
3 solid state MEMS accelerometers
3 magnetometers (magneto-resistive sensors)
1 barometric pressure sensor
1 GPS receiver

13. On-board guidance and navigation equipment:

a. The pilot interacts with the X6 UAV via the control transmitter. Critical status information from the UAV is relayed to the transmitter allowing instantaneous updates on system status.
b. With the "GPS hold" function activated, the X6 can operate semi-autonomously, allowing it to hover in place without pilot input.

14. Flight Data Recorder:

A flight data recording system saves flight data to a 1Gb MicroSD memory card stored in the handheld controller. Because the data is not stored on the helicopter itself, the data is secure in the event the UAV is lost. Data recorded includes onboard sensor flight data (altitude, orientation, speed, direction and link quality).

15. Automatic Emergency Landing System (AELS):

a. The X6 includes an automatic emergency landing system (sometimes called a "lost-link auto-land" feature). During the AELS sequence, the X6 terminates any horizontal motion, descends at a predetermined controlled descent rate and performs an automatic landing.
b. The X6's AELS will activate under the following conditions:
    i. Data link failure (loss of communications with the controller).
    ii. X6 battery drops to a predetermined level to ensure a controlled descent rate.

16. Other Special Features:

a. Real-time Altitude: Continual display of vehicle altitude is provided to the operator.
b. GPS Hold: The aircraft has a pilot-operated integrated GPS system that assumes a position and altitude hold when selected. In this mode, pilot control inputs continue to override the "hold" feature, but each time the controls are neutralized, the aircraft will maintain the location and altitude of the last input. This function can be turned on or off with a manual switch at any point during air operations.
c. Engine Failure Safety: The counter-rotating motors provide redundancy with the system remaining controllable in the event of a single engine/rotor failure. In such an event, the system can land safety using the remaining motors.
d. Ceiling limiter: An adjustable barometric pressure altitude limiting device allows for the selection of a maximum ceiling. Upon reaching the selected maximum altitude, the aircraft will automatically stop ascending with no effect on any other control inputs.

17. Maintenance:

a. The X6 UAV system requires minimal maintenance due to the low number of moving parts.
b. Critical performance data is monitored and recorded by the system itself which is used by the manufacturer to perform any required diagnostics or troubleshooting.

18. Camera Attachments:

i. 10 megapixel digital still camera with remote controlled tilt, zoom and shutter
ii. 1080p HD (high definition) video camera with remote controlled tilt
iii. Thermal FLIR (forward looking infra-red) camera with remote controlled tilt
iv. Low light (0.001 lux) dusk/dawn black and white video camera with remote controlled tilt.

H. Security Plan:

a. All operations will be conducted according to the applicable provisions of the Aeronautics Act and the Canadian Aviation Regulations.
b. Senior management personnel within the Royal Canadian Mounted Police have approved the operational use of UAV's for the above-noted purposes. As such, all flights (operational, training and test flights) are conducted within the indemnity of the Government of Canada.
c. RCMP personnel will be present at all flights to ensure the safe operation of the UAV. No flight operations will occur under the authority of this SFOC unless RCMP personnel trained in the safe operation and use of the Draganflyer X6 are present in a supervisory capacity.
d. All operations will commence and proceed only when sufficient personnel are present to safely undertake the operation.
e. At all times the UAV will be operated under the direct supervision of the Operations Manager or Deputy Operations Manager.
f. The UAV operator will take all reasonable measures to ensure that the operation does not pose a hazard to any person or property, including livestock.
g. Operations will be carried out in VFR conditions at all times.
h. The operator shall maintain unaided visual contact with the UAV at all times of operation.
i. All flights will be conducted during periods of clement weather with maximum wind speeds below 30 km/h.
j. The operator of the UAV will ensure that the UAV does not exceed the maximum SFOC permitted altitude. When operating near this maximum altitude, the operator shall program the maximum altitude feature in the X6's controller to ensure the UAV remains within these limits.
k. All daytime flights will be conducted at an altitude below 175 feet AGL.
l. All flights during periods of darkness or low-light will be conducted at an altitude below 100 feet AGL.

Security Plan (continued):

m. All operations within five miles of a controlled airport will be preceded by notification to the appropriate airport authority/flight control tower of specific location of operation and the estimated maximum height of operation and the expected time length of the operation. At the end of the operation the appropriate airport authority/flight control tower will be advised of the clearance of the operation.

n. During all flights, a safety officer will be present and in direct and immediate contact with the UAV operator. The safety officer will not be encumbered with any task other than to identify possible hazards to persons or property on the surface. The safety officer will immediately notify the operator of any such hazards.

o. When such hazards are noted, the UAV operator will adjust the flight operation to eliminate the hazard or shall safely cease operation of the UAV.

p. At all times of operation, police personnel will ensure that the area of operation is secure from general public access. A minimum radius of 30 meters around the UAV's intended area of operation shall be established and maintained.

q. During all flights, the location coordinates will be available to the operator.

r. Flights will not be conducted over members of the public nor any person not directly involved in the operation.

s. Access to all operational areas will be monitored and restricted by law enforcement personnel to prevent access by unauthorized persons. Where the operation of the UAV poses a physical threat to individuals or property the operation will be safely terminated or the situation causing the threat will be rectified.

t. In the event of use in an indoor facility, care will be taken to ensure no obstacle is in danger of damage and no flights will take place over or in the immediate vicinity of spectators.

u. Flight operations will be under the direct control of the operations manager or deputy operations manager who has met the training requirement for safe operational use and deployment of the Draganflyer X6. At no time will untrained persons operate the UAV's controls. Other law enforcement personnel may be utilized to operate the camera systems only.

v. Routes used for approach and departure during an operational flight will kept as short as possible to minimize encounters with obstacles. In most circumstances, the necessary photographs will be obtained with a short vertical ascent followed by momentary hovering with very little horizontal movement required.

w. The UAV itself and a log of all UAV flights will be maintained by the operations manager and will be available for inspection by Transport Canada personnel on reasonable notice.

x. When not in use or under the direct control of the operations manager or deputy operations manager, the UAV will be stored in a locked compartment or with other safeguards designed to prevent the unauthorized operation or handling of the aircraft.

I) Emergency Contingency Plan:

Due to the nature of the operational use, all operational sites will contain police personnel. Also, other emergency responders (fire and EHS) are often already on the scene or will be staged nearby. If necessary, contact with emergency services can be made through available RCMP radio communications systems or by cellular phone. Location coordinates of the operation will be available. If an emergency occurs, authorities can be notified and directed to the location. Local air authority contact numbers will be available at all operational locations.

All RCMP officers are trained in basic first aid and will be present during flights. First aid kits and fire extinguishers will be available on site at all flights.

J. Summary of Safety Features and Considerations:

The Draganflyer X6 is engineered for safe operation. The UAV's size, rotor layout, data link, flight recorder, software configurations, navigation lights and real-time telemetry all have safety features incorporated. The Draganflyer X6 is smaller and lighter than conventional helicopters with comparable performance. The helicopter poses no risk to persons in occupied buildings, as the low airframe weight (1000 grams) and low speed carry insufficient kinetic energy (momentum) to result in damage to a building or harm occupants within. Also, because it is an electric aircraft there is no fuel to leak and ignite. Where possible, flights over buildings will be avoided.

The on-board software continuously stabilizes the flight of the Draganflyer X6. This allows the pilot to accurately direct the helicopter rather than constantly focusing on manual stabilization. The X6 also keeps itself within pre-programmed angular flight limits to ensure it remains stable. The flight recorder transmits and saves flight data information to a storage card in the handheld controller. This flight data can be used for post flight analysis or to analyze the cause of abnormal performance. Data and control information for the helicopter are sent at 2.4 GHz with automatic channel selection to eliminate frequency conflicts. This ensures a reliable and secure connection. Streaming video is sent at 5.8Ghz, eliminating the possibility of interference with the data transmission.

The operation of the X6 is further facilitated by the bright navigation lights which not only assists in orienting the craft, but makes the device very visible, facilitating collision avoidance. With dual motors on each of the three arms, if an in-flight collision causes one of the rotors to break or one of the motors to stop working, the X6 will still be able to fly using the remaining five motors.

The X6's battery and handheld controller battery levels are monitored in real-time and displayed on the controller screen. An audible warning sounds and a visual alert appears if the battery becomes exhausted. If the helicopter continues to be flown despite these warnings, the helicopter will auto-land before the battery completely discharges. This auto-land feature is also initiated by the loss of communications.

Most operations for law enforcement use will require very low operating altitudes. This poses no threat to any full size manned aircraft which are operating at much higher altitudes.

25.104. Unmanned Aerial Vehicles (UAV)

Related Links

(Originator: OIC Traffic Services "E" Div.)

1. Definitions

1. 1. For this Policy:

1. 1. 1. Unmanned Aerial Vehicle (UAV) or Unmanned Aerial System means any unmanned remote controlled flying craft. This includes model airplanes and helicopters.

1. 1. 2. Pilot means the member operating any of the controls that govern the UAV's movement, not including controls that govern camera or payload operation.

1. 1. 3. Safety officer (also called a "spotter") means the member, in addition to the pilot, designated to oversee the UAV flight. The Safety Officer will be concerned with avoiding conflicts with other aircraft, potential collisions and possible risks to persons, property and the UAV itself.

1. 1. 4. Operations Manager means the member responsible for the safety, security and operation of the UAV program within a unit.

1. 1. 4. 1. The Operations Manager may appoint a Deputy Operations manager to assist with reporting and other regulatory purposes in their absence.

2. General

2. 1. The UAV:

2. 1. 1. is approved for use as an investigational aid for aerial photography on crime scenes, collision scenes, environmental/HazMat incidents, CPTED evaluations and similar purposes.

2. 1. 2. must not be used for covert surveillance of persons or vehicles, except in exceptional circumstances where there s an imminent risk to life or safety that can be alleviated by using the UAV.

2. 1. 3. must only be directly handled and operated by trained members who are competent in the UAV's operation.

2. 1. 3. 1. Training will be conducted by the UAV manufacturer or by an on site equivalent.

2. 1. 3. 2. To maintain proficiency and knowledge of operation, UAV pilots should maintain contact with other police UAV operators and attend any related training webinars, seminars, conferences or events designed to provide current nformation or training.

2. 1. 4. must be stored in a locked container under the control of the Operations Manager.

2. 1. 5. may carry cameras, video equipment, environmental or other sensors and objects provided that the payload carried is within the working abilities of the craft and that it can be done safely.

2. 2. Prior to initiating a UAV program, consider a media briefing in the region in which the UAV is expected to be operating.

2. 2. 1. The purpose of the media event is to inform the public about the uses for the UAV and reassure that it is not being used for surveillance.

3. UAV Operation

3. 1. The UAV may only be operated:

3. 1. 1. within the guidelines established by the relevant governing authorities (e.g. a Special Flight Operations Certificate from Transport Canada);

3. 1. 2. when all regulatory permits have been obtained;

3. 1. 3. in a safe environment and manner to prevent injury to any person or damage to property;

3. 1. 4. with both a pilot and a safety officer present at all times;

3. 1. 5. in winds not exceeding the device's safe handling characteristics and within the skill / ability of the pilot;

3. 1. 6. with the pre-approval of the regulative authorities, namely NavCanada and / or the local airport tower when used within controlled airspace; and

3. 1. 7. a safe distance from power lines, lamp standards and similar obstructions:

3. 1. 7. 1. avoid placing high voltage power lines between the pilot and the UAV to avoid potential electrical interference.

3. 2. Indoor operation of the UAV is permitted for training purposes, however indoor operational use of the device must:

3. 2. 1. be in a controlled area that can be carefully secured to prevent entry of bystanders; and

3. 2. 2. only be conducted in extreme emergencies such as a threat to life where the use of the UAV can mitigate the situation (e.g. an active shooter).

3. 3. Report any UAV damage to the Operations Manager immediately.

3. 4. Maintenance records are kept by the Operations Manager.

3. 5. **Pilot Responsibilities**

3. 5. 1. Is in charge of the UAV and its flight controls at all times.

3. 5. 1. 1. During operational flights, payload (camera) controls may be delegated to another person / controller to allow the pilot to focus only on the UAV operation.

3. 5. 2. Briefs the safety officer before and during the flight;

3. 5. 3. The pilot must have some knowledge of meteorology related to the operation of the UAV including micrometeorology factors such as wind shear around buildings.

3. 5. 4. The pilot must comply with all requirements of the Special Flight Operations Certificate (SFOC) or similar legal authority under the Aeronautics Act and all Transport Canada directives relating to the UAV's operation. The SFOC and SFOC application must be carried at all flights.

3. 5. 5. Ensures that the intended area and altitude of operation is not within controlled airspace or if so, that pre-approval from the relevant authority (usually NavCanada or local airport control tower) has been obtained.

3. 5. 6. Falls under the direction of and reports the details of all flights with the UAV to the Operations Manager.

3. 5. 7. Is trained in the operation of the UAV being flown and has read the operator's manual for the aircraft.

3. 5. 8. Must complete all pre-flight safety and equipment checklists for the UAV.

3. 6. **Safety Officer Responsibilities**

3. 6. 1. Must be within unaided speaking distance of the pilot at all times.

3. 6. 2. Ensures the safe flight of the UAV and immediately reports to the pilot the presence of any manned aircraft in the vicinity of the UAV operation.

3. 6. 3. Immediately reports to the pilot anything that could pose a risk to the UAV or to the safety of any person.

3. 6. 4. Must not be distracted by any duty other than acting as a safety officer and ensuring safe flight of the UAV. The safety officer may not operate any flight controls of the UAV nor any camera / payload controls.

3. 7. **Operations Manager Responsibilities**

3. 7. 1. Is trained in the operation of a UAV.

3. 7. 2. Designates all new and existing pilots as competent to operate a UAV for that unit.

3. 7. 3. Maintains all UAV records, flight logs, training logs and related documents.

3. 7. 4. Provides regular reports to Transport Canada including UAV logs, records, and incidents that resulted in damage or injury to items as dictated by Transport Canada.

3. 7. 5. Ensures that a SFOC or similar legal permit / authority under the Aeronautics Act has been obtained prior to commencing any UAV flight.

References

Unmanned Air Vehicle (UAV)

Personal Aviation, Special Flight Operations & Launch Safety

Definition of Unmanned Air Vehicle (UAV)

Section 101.01 of the *Canadian Aviation Regulations* (CARs) states, "Unmanned Air Vehicle" means a power driven aircraft, other than a model aircraft, that is operated without a flight crew member on board.

Unmanned air vehicles have been given many names, but are most commonly referred to as unmanned aerial vehicles (UAV), unmanned air vehicles, remotely operated aircraft or remotely piloted vehicles. Unmanned air vehicles may take the form of airships, aeroplanes or rotorcraft. Basically, they could be considered to be any unmanned aircraft that performs a useful mission and can be remotely controlled or has autonomous flight capability.

How unmanned air vehicles are different from model aircraft

"Model aircraft" means an aircraft, the total weight of which does not exceed **35 kg** (77.2 pounds), that is mechanically driven or launched into flight for **recreational purposes** and

that is not designed to carry persons or other living creatures. Although some micro unmanned air vehicles may weigh less than 35 kg, they are operated by research institutions and other organizations for non-recreational purposes.

Uses for unmanned air vehicles

Unmanned air vehicles operate in diverse environments, in high risk roles, including but not limited to: atmospheric research (including weather and atmospheric gas sampling), scientific research, oceanographic research, geophysical research, mineral exploration, imaging spectrometry, telecommunications relay platforms, police surveillance, border patrol and reconnaissance, survey and inspection of remote power lines and pipelines, traffic and accident surveillance, emergency and disaster monitoring, cartography and mapping, search and rescue, agricultural spraying, aerial photography, promotion and advertising, weather reconnaissance, flight research, and fire fighting monitoring and management.

Advantages of unmanned air vehicles

Unmanned air vehicles are not constrained by human limitations and requirements. They make it possible to gather information in dangerous environments without risk to flight crews. They can be much more cost effective than manned aircraft operations, although recurring costs to repair or replace those damaged during flight can be very high.

How unmanned air vehicles are regulated

Section 602.41 of the CARs states, no person shall operate an unmanned air vehicle in flight except in accordance with a Special Flight Operation Certificate (SFOC). Section 623.65 outlines information that should be submitted when making an application for a SFOC. Be sure to make your request as early as possible and provide as much information as possible. You must be able to demonstrate the predictability and reliability of the unmanned air vehicle, essentially that it has the ability to perform in the desired environment. The requirement for a SFOC is intended to ensure the safety of the public and protection of other users of the airspace during the operation of the unmanned air vehicle.

The following constitutes an application to conduct the flight of an unmanned air vehicle:

(a) the name, address, and where applicable, the telephone number and facsimile number of the applicant;

(b) the name, address, and where applicable the telephone number and facsimile number of the person designated by the applicant to have operational control over the operation (Operation Manager);

(c) method by which the Operation Manager may be contacted directly during operation;

(d) the type and purpose of the operation;

(e) the dates, alternate dates and times of the proposed operation;

(f) a complete description, including all pertinent flight data on the aircraft to be flown;

(g) the security plan for the area(s) of operation and security plan for the area(s) to be overflown to ensure no hazard is created to persons or property on the surface;

(h) the emergency contingency plan to deal with any disaster resulting from the operation;

(i) the name, address, telephone and facsimile numbers of the person designated to be responsible for supervision of the operation area (Ground Supervisor), if different from the Operation Manager during the operation;

(j) a detailed plan describing how the operation shall be carried out. The plan shall include a clear, legible presentation of the area to be used during the operation. The presentation may be in the form of a scale diagram, aerial photograph or large scale topographical chart and must include at least the following information:

1. the altitudes and routes to be used on the approach and departure to and from the area where the operation will be carried out;

2. the location and height above ground of all obstacles in the approach and departure path to the areas where the operation will be carried out;

3. the exact boundaries of the area where the actual operation will be carried out;

4. the altitudes and routes to be used while carrying out the operation;

5. any other information pertinent to the safe conduct of the operation requested by the Minister.

Unmanned Air Vehicles Operating Beyond Visual Range

More and more UAV operators are making applications for Special Flight Operations Certificates (SFOCs) where the UAV is to be operated beyond visual range. Once the applicant demonstrates the ability to conduct a safe operation, the Minister shall issue the special flight operations certificate. The SFOC process allows each application to be considered on it's own merits, and the operator must evaluate the risks associated with the proposed operation and provide satisfactory risk mitigation measures.

While the ultimate goal is to "normalize" UAV operations within civil airspace, the industry technology is not mature enough, and the regulatory structure is not in place, to support routine operations. Detect, sense-and-avoid (DSA) capability is a key to routine UAV operations. The goal of any detect, sense-and-avoid system is to perform those collision avoidance function s normally provided by a pilot in a manned aircraft. Therefore, a DSA system will have to detect the traffic in time to process the sensor information, determine if a conflict exists, and execute a manoeuver according to the right-of-way rules. If pilot interaction with the system is required,

transmission and decision time must also be included in the total time between initial detection and the point of minimum separation. The DSA system will have to possess the capability to detect both participating and non-participating aircraft.

The probability of a UAV colliding with another aircraft must be comparable to that for manned aircraft (i.e. an equivalent level of safety). Vigilance for the purpose of detecting potential collisions must not be relaxed for any aircraft in flight, regardless of the type of flight, type of aircraft or class of airspace in which the aircraft is operating.

The availability of reliable DSA technology is likely to be a significant number of years away. Until that time arrives, UAV operators proposing to operate beyond visual range need to be aware that, depending on the mission and the operating environment, it may not be possible to find ways to safely integrate the operation with the manned aircraft. Each SFOC application will, of course, continue to be assessed on an individual basis.

Where to send your application

If you need more information, or wish to make an application for a Special Flight Operations Certificate - unmanned air vehicle, you may contact any of the following regional offices or service centres:

Regional Contacts

Date modified:
2010-05-03