

GEOSURV II UNMANNED AERIAL VEHICLE
FINAL REPORT

PART E
AIRWORTHINESS AND CERTIFICATION

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ABSTRACT

The Airworthiness and Certification (ACE) is one of the five groups within the GeoSurv II project team. The ACE group is dedicated to addressing all items of a regulatory nature within the project. During the 2008-2009 project year, the three major tasks for the ACE group were the following:

- Obtaining Transport Canada Flight Authority to carry out the first flights
- Publishing the Operating Manual for the prototype
- Continuously updating the Certification Plan of the GeoSurv II UAV system

A Special Flight Operation Certification (SFOC), issued by Transport Canada (TC), is required prior to operating an Unmanned Aerial Vehicle (UAV). To obtain this flight authority, the ACE group examined the Transport Canada SFOC standards and requirements, gathered relevant information, and compiled the SFOC application. After submitting the application, ACE continued to interact with TC to resolve any outstanding issues.

During the project year, ACE was assigned the task of creating an Operating Manual for the prototype (POM). The procedures within the POM act as the guideline for the safe operation of the prototype. It provides the operator with the required knowledge of the complete UAV system, operating guidelines, assembly and testing procedures, and the checklists required for the safe operation of the aircraft. The composition of many of the checklists and procedures are delegated to other specialty groups as appropriate. ACE has worked closely with these groups to create the required POM content.

The goal of the certification plan of GeoSurv II is not to obtain a type certificate for the UAV in the near future. It is intended to guide the design and manufacturing of GeoSurv II so that the final product may enter a formal certification process in the future and be certifiable with a minimal number of required modifications to the design. The standards used were developed by System Safety and Certification Groups in preceding project years, and each standard has been delegated to a design group. The groups are responsible to ensure that the design complies with these standards. If GeoSurv II complies with these design standards, it is also expected to assist with future SFOC applications by demonstrating an increased level of safety.

NOMENCLATURE

ACE	Airworthiness and Certification Group
ATB	Avionics Test Bed
CAR	Canadian Aviation Regulation
DR	Design Report
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FAR-23	Federal Aviation Regulations Part 23 – Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Airplanes
FFRR	First Flight Readiness Review
GCP	General Compliance Program
POH	Pilot’s Operating Handbook
POM	Prototype Operating Manual
SAF	System Safety and Certification Group
SFOC	Special Flight Operations Certificate
SI	Staff Instruction
SGL	Sander Geophysics Limited
TC	Transport Canada
UAV	Unmanned Aerial Vehicle

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1. INTRODUCTION

The Airworthiness and Certification (ACE) group is responsible for dealing with all matters related to airworthiness, system safety, aircraft certification, and other regulatory items. The ACE group was formerly known as the Systems Safety and Certification (SAF) group. The group was renamed during the current project year to better reflect the current responsibilities and the work currently performed by the group.

The ACE group is composed of one lead engineer and two student members. The work has been divided between the two student members, with each member given both primary and secondary duties. There were three major objects for the ACE group during the 2008-2009 project year: obtaining the Special Flight Operations Certificate (SFOC), creating the Operating Manual for the prototype (POM), and continuously working on the Certification Plan for GeoSurv II.

The work performed by the ACE group during the current project year, the progress made, and the recommendations for the future project year are described in this Report. The ACE portion of the Report comprises three Sections, each addressing a main task as listed below, followed by Conclusions and Recommendations:

- The first Section outlines the requirement of a flight authority for an Unmanned Aerial Vehicle (UAV), and the work performed on the Special Flight Operations Certificate (SFOC) application to obtain this authority.
- The second Section summarizes the work performed on the Certification Plan for GeoSurv II. This is intended to aid in the certification process of GeoSurv II when the regulating authorities move to fully integrate UAVs into their respective airspace systems in the future.
- The third Section discusses the work performed this year on the Prototype Operating Manual (POM), which is a requirement for first flight as governed by the SFOC application.

Other duties assigned to ACE during the project year included general safety assessments. This involved reviewing the work performed by the project team and looking for methods to improve the safety of the GeoSurv II prototype and production aircraft.

2. SPECIAL FLIGHT OPERATION CERTIFICATE AND APPLICATION

The objective of the 2008-2009 GeoSurv II project team is to build the prototype aircraft and system, then conduct initial flight testing. It is the ACE group's responsibility to obtain the Transport Canada flight authorization so that the team can perform flight test operations. The ACE group also provides assistance to the design groups in planning the flight tests so that TC, the civil aviation authority in Canada, will remain confident that the GeoSurv II UAV is operated safely. The required document to operate a UAV is a Special Flight Operation Certificate

(SFOC). The SFOC application sent to TC includes details of the operation, together with the overall design of the system and all of the design and operating safety features and considerations.

2.1 Backgrounds about SFOC

The SFOC is a document required by the Canadian Civil Aviation Regulations (CARs). It authorizes special flight operations for aviation operations that are outside the general aviation definition. The aircraft operating under an SFOC normally don't have a type certificate issued to the type design, and thus may not have a certificate of airworthiness to authorize the operation. In Canada the requirement for an SFOC and definition of special flight operations are governed by the CARs.

In the CARs, paragraphs 603.65 through 603.68 [1] are sections dedicated to UAV operation. Note that the term UAV does not only include the aircraft itself, but also the entire system, including communication and control devices, and the ground station. The regulations state that a UAV operation activity falls under the category of miscellaneous special flight operations; and one cannot conduct such operation unless the operator holds a valid SFOC for the operation.

Each SFOC is issued only for a particular aircraft or collection of aircraft, to carry out a well defined set of operations, during a specific period of time. The SFOC contains all the details of the operation, and the operator is not authorized to conduct any activities outside the envelope provided in the SFOC.

For the past several years the GeoSurv II project team has been flying a number of Avionics Test Bed (ATB) aircraft. Those aircraft, which are modified model aircraft, are mainly used for testing the functionality of a number of components of the avionics system. Due to the significant differences in the design of the aircraft and the purpose of the operation, the previous SFOC applications can't be reused with minor modifications. Therefore a new SFOC application has to be prepared and submitted.

2.2 The Application for SFOC of the Prototype Flight

Although Transport Canada requires an application for SFOC, there is no standard application form. Thus the ACE group needed to be creative when compiling the application to demonstrate to TC that the proposed operation meets all the safety conditions which they require. The CAR Standards 623.65(d) [2] and the TC UAV SFOC Staff Instruction document [3] were used as the basis of the application. Some points that needed to be clarified were addressed at a meeting held between the ACE group and the TC official in charge of issuing UAV SFOCs at the time.

After interactions with the other design groups and lead engineers, the application was finalized to have four major components: the general information, the aircraft system description, the description of the operation, and the safety consideration. The complete SFOC application can be found as an attachment to DR 108-02 "Submission of SFOC Application" [4].

2.2.1 General Information

The general information includes all administrative items of the SFOC, such as the contact information of the project/operation management. This establishes the responsibilities of team members involved in flight operations and a point for accountability. It also gives the overall goal or purpose of the operation, anticipated time of the operation, and the weather limitation. For the prototype test flights, the goal is to validate a number of performance predictions and determine flight characteristics. The flights will be under visual meteorological conditions with calm wind.

2.2.2 Aircraft System Description

TC needs to have a good understanding of the aircraft and related systems. In this section, the GeoSurv II's geometry and general layouts are presented. The onboard systems that could affect the safety of the operation are discussed. Such systems include power plant, fuel system, and avionics. Control method will be strictly by standard remote control aircraft transmitter from the ground. There is also a section being dedicated to the safety features incorporated into the design of the aircraft. The GeoSurv II UAV has dual independent receivers within the command system, which distributes signals through the control system to the actuation servos, and achieves control redundancy. Also, there is an Independent Flight Termination System (IFTS). In certain cases of emergency, the IFTS cuts off the power supply to the engine ignition, stopping the engine and thus terminating the flight. These features are discussed in further detail in the Avionics Chapter of this Final Report.

2.2.3 Description of the Operation

The airfield selected for the test flight is the Arnprior Airport (CNP3), formerly the South Renfrew Municipal Airport. It is in class G airspace, and it is not controlled. The airport officials suggested that the project team use the main runway (RWY10-28, 3955ft) for the operation. There are no unmarked obstacles on the take off and approach paths. The airport operates only with left hand circuit.

The test flights will carry out a number of take off and landings, with various climb and descent rates. There will be test on performance in pitch, roll, yaw, and level flight attitudes. The proposed maximum altitude is 1000ft AGL.

2.2.4 Safety Considerations

One of the primary purposes of the SFOC application is to demonstrate that the proposed operation is safe to conduct. Therefore the safety considerations of the operation are very important:

- First Flight Readiness Review (FFRR) – it is the final design review and aircraft inspection before the first flight. All relevant information available is used to conclude whether or not the operation is safe. This will be performed following the ground tests, and the results from the ground tests will be reviewed at the FFRR.

- Operating Manual – this is a document that provides instructions and guidelines for all the operating procedures. It also contains a number of checklists that require sign off when completed, and will be filed in the technical log. As part of the ACE group's responsibility, the POM will be discussed in further detail later in this report.
- Other items – the project team will follow the emergency and security plans at the airport, and stay in contact with the air traffic controls. Other information is also provided to TC to carry out their risk assessments.

2.3 Summary

The SFOC application has been prepared following the guidance of the Staff Instruction in [1]. This includes a significant amount of information on the safety features of the UAV design and safety considerations of the operation. The finalized application was submitted to TC, and is currently being reviewed by the Ontario Regional office. The Regional office has sent a draft SFOC for ACE to review. An official SFOC is required for the first flight.

2.4 Recommendations

From the conclusion of the current SFOC application, it is recommended for the future project year's team to apply for a new SFOC to cover test flights for

- Autopilot system
- Long range, long duration missions

3. CERTIFICATION PLAN

A Certification Plan is a document developed between an applicant for the certification of an aeronautical product and Transport Canada. It is used for new designs, variants of existing designs, and for design changes. The development of a Certification Plan is most beneficial when the applicant is unfamiliar with the certification process as it establishes the expectations and responsibilities of both parties as required for a successful certification process.

Although the use of a Certification Plan is not technically required by Transport Canada as a prerequisite for certification, their use is highly recommended as they have been shown to result in increased efficiency in the certification process through reducing costly misunderstandings between an applicant and Transport Canada. The certification management and tracking are usually done with a General Compliance Program (GCP) which provides the basic means of compliance with codes (T=test, A=analysis, etc). However, the GCP provides few additional details on how compliance with a certification standard is to be shown. This often leads to misunderstandings between Transport Canada and the applicant which only surface late in an aerospace product development project. These misunderstandings then compromise the applicant's delivery deadlines to their customers and can result in significant financial consequences for the applicant.

Although there is considerable discussion on the basic means of compliance outlined in the GCP, there is a lack of early detailed discussions on the means and methods of certification, and therefore little or no formal documentation. This process makes it difficult to identify the compliance documentation and required activities to demonstrate compliance. To avoid the inherent shortfalls of a GCP, a Certification Plan can be used to improve the certification process by:

- Improving communication between an applicant and Transport Canada.
- Increasing the overall efficiency of the certification process by reaching agreements early in a development project with respect to the detailed methods of compliance.
- Promoting the documentation of discussions and agreements with Transport Canada, which may assist the applicant in avoiding duplication of certification activities when applying for foreign certification.
- Providing an early and clear understanding of expectations of the parties involved in order to achieve certification. This will also clarify who has responsibility of the type design and substantiating data.

Historically, many misunderstandings of expectations between an applicant and Transport Canada arise only after the product is designed and built. The utilization of a Certification Plan can often lead to the appropriate design changes in the conceptual design phase of a development project to satisfy certification standards. Correcting any problems or deficiencies which may stand in the way of a product being certified early in a project also minimizes the costly delivery delays and related expenses related to modern aeronautical products.

Additional information on Certification Plans is contained within design report DR108-03 “GeoSurv II Certification Plan” [5], the content of which is beyond the scope of the current report. Further information is also available in Transport Canada Advisory Circular (AC) 500-015 [6].

3.1 Certification Issues Unique to UAVs and to GeoSurv II

Prior to starting development of a Certification Plan, an applicant and Transport Canada should review the product type certification, modification, or repair approval activity as well as the GCP to determine if a Certification Plan will be required for the project as a whole. In cases where the means and method of demonstrating compliance are already well understood and agreed upon through a previous related program, a Certification Plan may not be required. If a Certification Plan is required, each specific requirement for demonstrating compliance is to be discussed to determine if there is a need to develop a Certification Plan for a particular requirement. [5]

There are currently no existing certification standards for a UAV from any of the primary civil aviation regulating bodies, and therefore the development of a set of certification standards for use in the design of GeoSurv II was required. It is the intention of the ACE group that at such time that Transport Canada or other international regulatory bodies begin to certify UAVs for

integrated flight in their respective airspace systems that GeoSurv II will already be designed to meet the majority of their required certification standards. This will accelerate the formal certification processes for GeoSurv II while also minimizing the required design changes. The area of UAV certification standards is sufficiently underdeveloped that the in-house development of UAV certification standards within the GeoSurv II project may become a basis for the official UAV certification standards of the regulatory agencies.

During the 2008-2009 project year, the current ACE group continued with the work performed in previous project years on the development of UAV certification standards intended for GeoSurv II. The most relevant existing standards for manned aircraft, while also being the most likely candidate from which official UAV certification standards will be developed were previously identified as the FAR-23 Standards used in the United States by the Federal Aviation Administration (FAA). Most international general aviation certification standards are derived from FAR-23. However, there are some significant differences which exist between a manned aircraft and a UAV such as the nature of the control system, instrumentation, and human factor issues which necessitate significant modification of the FAR-23 Standards to create an appropriate set of certification standards for a UAV such as GeoSurv II. The creation of a set of UAV certification standards for use with GeoSurv II has been an ongoing goal of the ACE (formerly SAF) groups for several years.

An important concern regarding the Certification Plan of GeoSurv II is that Transport Canada is not presently prepared to commit manpower to be involved in the certification aspects of this project. Attempting to certify a civil, commercial UAV in Canada is leading edge in nature and is a very demanding task. There are many regulatory complexities which first need to be addressed to make this task feasible. The certification process for this project is therefore being simulated, using unofficial standards developed in-house. The ACE group is therefore attempting to simulate how Transport Canada might reasonably be expected to act when they do commence UAV certification, and are currently assuming that Transport Canada's desired Level of Involvement for this simulated certification process is nil, and that the responsibility for making all findings of compliance is undertaken by ACE.

The official Type Certification process which will be used for a UAV in the future is expected to differ from the simulated certification process currently being used and will be based on different certification standards. Regulating authorities such as Transport Canada will inevitably play a larger role in the certification process in the future by having more involvement in certification activities. The regulating authorities are unlikely to delegate all of the findings of compliance for a UAV to an applicant. However, the current efforts of the ACE group are intended to minimize the time and cost involved in the certification process once it is formally developed and implemented. This will result in the maximum utility for GeoSurv II. It should also be noted that Sander Geophysics operates world-wide and that many countries outside of North America have less stringent aviation regulations. The current simulated certification process may therefore yield benefits in areas outside of Canada if foreign regulatory agencies accept the process and allow the integration of GeoSurv II into their airspace.

The primary focus for this project year has been on the initial flight testing of the prototype aircraft, which will differ from the final production aircraft. As a result, much of the required

work on the certification process by the specialty groups has been deferred. In some cases, components do not meet their design specifications and would not currently pass the certification process. However, these components are considered adequate for initial flight tests, as these will be conducted within a reduced flight envelope. Some other components are unique to the prototype aircraft itself (i.e. air data probe, avionics systems, landing gear). Although many components designed this year are intended for use on GeoSurv II, some are expected to be re-designed following initial flight tests. Showing compliance for items which are unique to the prototype or have been identified as candidates for redesign was not required during this project year.

3.2 Tasks Completed

The 2008-2009 project year began for ACE with a review of the in-house UAV certification standards as well as a review of applicable general information for UAVs of a regulatory or legal nature. These UAV certification standards have been iteratively developed by previous years' SAF (now ACE) groups.

Each certification standard was reviewed and assigned to a specific specialty group or groups. The ACE group then met with each specialty group with the standards assigned to that group to receive their input. ACE then incorporated the input received from the specialty groups into revised sets of standards for each group, as well as performed modifications on some standards.

A number of certification standards were also found to be either not applicable to GeoSurv II or not applicable to the prototype aircraft configuration. Out of the 340 certification standards previously identified as applicable to a general light UAV, there are now 223 sections found to be applicable to the GeoSurv II production aircraft which need to be addressed.

Work has continued with the specialty groups in their efforts to satisfy the certification standards throughout the term. A thorough DR 'mining' exercise was conducted to identify which certification standards have been addressed by the project team this year. There have been 11 DRs identified thus far with applicable information to be added to the Certification Plan. However, most DRs for the January 2009 to April 2009 period are not expected to be available to ACE until after the end of the current project year, and it is expected that significant additional information will be available within those reports. To date, there have been 46 certification standards addressed by the specialty groups.

3.3 Future Plans

The tentative date for completion of the Certification Plan is by 31 Dec 2009. This task was originally planned to be completed by the end of the current project year but has been delayed due to insufficient data available at present to finalize the Certification Plan. This is best done after further progress has been made and the requirements of the Certification Plan are better defined.

The means and methods of demonstrating certification compliance need to be covered in additional detail with specialty groups as they are addressed. The majority of the standards

addressed thus far seem to have been done so in a convincing manner, although others will require additional supporting information to adequately satisfy the certification standards.

The data relevant to the Certification Plan found through the DR data mining exercise is to be evaluated and then integrated into the certification Compliance Plan, which forms a record of the deliverables for certification tasks. A renewed data mining exercise will also need to be conducted to search for certification related information within the DRs which will be submitted by the specialty groups at the end of the project year. The current project year is unique due to the impending first flight of the prototype, with the result that some work will be continuing beyond the end of the current project year into the early summer of 2009. The data mining of the end of year deliverables and integration into the Certification Plan of the relevant data is expected to be completed during this time.

3.4 Summary

The approach which the ACE group is taking towards certification of GeoSurv II is following the most relevant process currently available. However, the certification process for GeoSurv II is being simulated out of necessity as there are currently no official certification standards for a UAV available.

Transport Canada does not currently have sufficient manpower to be involved in this project, and without their involvement a true Certification Plan cannot be developed. Work will continue on the Certification Plan based on best effort and modifications to the Certification Plan will be required as the project develops. The current approach combined with thorough design documentation will minimize the time required to achieve certification of GeoSurv II or derivative models in the future. GeoSurv II is expected to meet the majority of the certification standards once they are developed. The Certification Plan should therefore reasonably prepare GeoSurv II for Type Certification (once implemented for UAVs) and the subsequent removal of the requirement to operate under an SFOC, which will increase the utility of GeoSurv II.

A number of certification standards were also found to be either not applicable to GeoSurv II or not applicable to the prototype aircraft configuration. Out of the 340 certification standards previously identified as applicable to a general light UAV, there are now 223 sections found to be applicable to the GeoSurv II production aircraft which need to be satisfied. To date, 46 of these have been addressed.

The current simulated certification process may also yield benefits to SGL in areas outside of Canada if foreign regulatory agencies accept the simulated certification process followed and allow integration of GeoSurv II into their airspace.

4. OPERATING MANUAL FOR GEOSURV II PROTOTYPE

One of the items within the Transport Canada Staff Instruction (SI) for an SFOC application [7], suggests the creation of an aircraft operating manual when applying for an SFOC. An Operating Manual would aid in the approval of the SFOC application for the GeoSurv II prototype aircraft

and would also contribute to a higher degree of safety for the operation of the aircraft in general. As a result, the SFOC application submitted to Transport Canada stated that an operating manual sufficient for flight tests of the prototype aircraft would be available before first flight. The issuance of an SFOC is linked to the initial application and the content therein. Therefore, the completion of an operating manual for the GeoSurv II prototype will become a regulatory requirement for first flight following the issuance of the SFOC.

An aircraft operating manual is similar to a Pilot's Operating Handbook (POH), but with additional information for the operation of the prototype by the project team. This includes more detailed descriptions of the systems of the aircraft. An aircraft operating manual however excludes the flight planning data commonly contained within a POH, as this data is not approved by the regulating body. The information contained within an operating manual is of an official nature and is a result of the certification process and is approved by the regulatory authority. Although the information in the operating manual for GeoSurv II is not approved, the manual is written to be similar to an approved aircraft operating manual.

The current operating manual in use for GeoSurv II is referred to as the Prototype Operating Manual (POM). This is a working draft document which will evolve along with the GeoSurv II UAV through its various design configurations and will eventually form the basis for the POH to be used operationally by SGL personnel. The POM has already completed several iterations of specialty group feedback and many improvements have been made. ACE has been responsible for writing the general aircraft checklists. The flight critical details for the initial flights have will be added to the POM to ensure it is ready for use during the initial test flights. The additional information outlined in DR 108-01 "Prototype Operating Manual" [8] will be added as it becomes available.

4.1 Prototype Operating Manual Contents

The POM is intended to contain all of the information required by the project team to operate the aircraft during the initial flight tests. The manual contains:

- A description of the aircraft, its components, and how they operate.
- Flight operating characteristics and a description of aircraft operation as required by the pilot.
- Maintenance tasks that require sign-off, including assembly, disassembly, & ground tests. These tasks are recorded separately in the Technical Log.
- Chronological checklists for aircraft operation.

For additional information, please see DR108-01 "Prototype Operating Manual" [8] which contains further details as well as the current POM.

4.2 Summary

The development of the Prototype Operating Manual (POM) for GeoSurv II is a regulatory requirement for the validity of the SFOC (once issued) and as such is required for the initial test flights of the prototype aircraft. The POM includes detailed descriptions of the systems of the aircraft but does not contain flight planning data. It also contains the flight operating characteristics and maintenance tasks. The POM is currently a working draft document which will evolve along with the GeoSurv II UAV.

Many of the flight critical components of the POM required for the validity of the SFOC have been constructed already, with the remainder to be added to the POM ahead of the first flight. The additional components of the POM will be inserted as they become available.

As operations become more complex, the POM will need to be updated to ensure that it remains relevant to the actual aircraft and the operations being conducted. Therefore, changes to the operation of the aircraft or its configuration require a revised manual to be applicable to the aircraft and thus validate the SFOC.

5. CONCLUSIONS

5.1 Special Flight Operations Certificate

The application of the SFOC is the legal requirement to carry out the test flight. The application has been compiled and submitted to TC. The ACE team is currently in contact with TC officials to ensure the issuance of the SFOC in advance of intended first flight of the prototype. A draft SFOC has been received by the GeoSurv II Team for review.

5.2 Certification Plan

The tentative date for completion of the Certification Plan is 31 Dec 2009. The means and methods of demonstrating certification compliance need to be covered in additional detail with specialty groups as they are addressed in the upcoming project year.

The approach that the ACE group is taking towards certification of GeoSurv II is following the most relevant process currently available. However, this process is being simulated out of necessity as there are currently no official certification standards for a UAV available. Additional work and modifications to the Certification Plan will be required once official certification standards are developed by the regulatory bodies. It is intended however, that the current approach combined with thorough design documentation will minimize the time required to achieve certification of GeoSurv II or derivative models in the future.

Out of the 340 certification standards previously identified as applicable to a general light UAV, there are now 223 sections found to be applicable to the GeoSurv II production aircraft which need to be satisfied. To date, 46 of these have been addressed.

5.3 Prototype Operating Manual

The development of the Prototype Operating Manual (POM) for GeoSurv II is a regulatory requirement for the validity of the SFOC (once issued) and as such is required for the initial test flights of the prototype aircraft. The POM is currently a working draft document which will evolve alongside the GeoSurv II UAV. The flight critical components of the POM required for the validity of the SFOC will be completed prior to first flight, and the remainder of the components will be added as they become available.

6. RECOMMENDATIONS TO 2009-2010 PROJECT TEAM

It is recommended that:

- The ACE group obtains new SFOCs covering greater scopes of operation after completion of the initial flight tests. This is particularly important when the autopilot system is installed and incorporated in the control loop.
- The ACE group continues work on the Certification Plan and ensures that the specialty groups address the remainder of the certification standards.
- The ACE group continues work on the POM and updates the document as additional information becomes available. The document must also be kept up to date with the aircraft and the operations performed.

7. REFERENCES

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- [3] Transport Canada UAV SFOC Application – Staff Instruction. Accessed through: <http://tc.gc.ca/CivilAviation/general/recavi/Instructions/Unmanned/section2.htm> on Oct 16th, 2008
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- [7] Transport Canada Staff Instruction 623-001 – “The review and processing of an application for a Special Flight Operations Certificate for the Operation of an Unmanned Air Vehicle (UAV) System”. Effective date: 27 Nov 08. Accessed through: <http://tc.gc.ca/CivilAviation/IMSdoc/IMSDocuments/600/623-001.htm> on 27 Mar 09.
- [8] Osmun, D, DR 108-01 Version A, “Prototype Operating Manual”. Course AERO4907, Carleton University, Ottawa, Canada, 2009.

8. DESIGN REPORTS

DR 98-01	Certification Plan Donald Osmun
DR 98-02	Special Flight Operation Certificate Justin Luo
DR 108-01	Operating Manual Donald Osmun
DR 108-02	SFOC Application Submission Justin Luo
DR 108-03	Certification Plan Donald Osmun