

necessary "raw material", (sheet, tubing, fabric, wood) accessories, etc. from various aircraft vendors and sources.

However, during the 1970's "kits" were being offered to prospective owners/builders that included most, if not all, of the raw material necessary to complete the aircraft. During subsequent years this trend continued to expand to the extent that many major components and major sub-assemblies are now included in many such kits, with the view to reducing the man hours necessary to complete the aircraft. The obvious result of this trend is that many amateur-built aircraft kits are now available whereby it is questionable whether or not the owner/builder is "building" the major portion of the aircraft, or simply assembling the components to complete the aircraft.

Because of the proliferation of these kits and their builder content causing potential conflict with the Major Portion requirement, questions and controversy have frequently arisen with respect to defining what constitutes the major portion of an amateur-built aircraft. Although major portion has been interpreted as more than 50% of the total aircraft (or airframe) this has proven to be inadequate and more definitive criteria are required. Interpretations and judgements between different Transport Canada Regional Offices and others who evaluate or review evaluations may vary widely resulting in a lack of uniformity. This variation is unacceptable and so evaluation procedures must be standardized.

Methodology Used. Various methodologies or criteria can be used to determine compliance with the Major Portion requirement. Most of these methodologies are subjective and require the assessor to make judgements to a greater or lesser degree; thus leading to inconsistencies. However a system based upon a simple parts count or total, as this AMA does, reduces subjective decisions to the minimum. It also has the advantage of being the simplest system to utilize to provide consistent and equitable results nationwide.

The kit evaluation methodology used in this AMA determines the number of parts constructed or assembled by the builder compared with the number of parts constructed or assembled and supplied by the manufacturer.

This methodology is the same as used by the FAA; this commonality then has obvious advantages for airworthiness authorities, manufacturers and builders in both Canada and the U.S.A. (i.e. potential for mutual acceptance of kit evaluation by the respective airworthiness authorities).

No evaluation methodology is perfect and it is recognized that the one used in this AMA can lead to abuse. Manufacturers can, in order to ensure their content does not exceed the Major Portion requirement, provide a kit that has most labour-intensive parts supplied and have the builder content with many parts that require few manhours to finish.

This AMA provides guidance material to evaluate amateur-built aircraft kits to determine whether they comply with the Major Portion requirement of Chapter 549, (section 549.5, para a).

Note: this evaluation should not be confused with the evaluation of amateur-built helicopters and aerobatic aeroplanes (Ref. Chapter 549.101 (C)(2) and 549.201(C), AMA 549/1, AMA 549.101, AMA 549.201)

4. Use Of Checklist (Appendix A)

The checklist at Appendix A may be used:

(a) To determine whether a kit intended for an amateur-built aircraft meets the Major Portion requirement of Chapter 549.

(b) To provide guidance to a kit manufacturer to determine if a proposed kit-built aircraft meets the Major Portion requirement of Chapter 549. By use of this checklist it may be determined at the early stages if a kit is eligible for amateur-built approval. Thus the kit manufacturer may be able to adjust the kit content to meet the Major Portion requirement.

(c) Prior to beginning a kit. To resolve any controversy with respect to the major portion which may arise in the approval of an amateur-built aircraft under the provisions of Chapter 549. Questionable cases might be where the aircraft was built from pre-fabricated major components that are readily available from aircraft parts suppliers, or the aircraft was built using major components from previously certified aircraft.

Procedure/Instructions

5. Application Procedure:

(a) The responsibility for initiating a request for a kit evaluation normally rests with the kit manufacturer; however, under certain circumstances the kit manufacturer may not be willing, or otherwise able to do this. In such cases, a prospective owner/builder or other interested party (such as a potential distributor) may act as the applicant and initiate the evaluation request.

(b) The applicant should contact the Regional Director, Airworthiness (RDA) to discuss the project and submit an application for kit evaluation.

(c) The RDA may elect to have the evaluation performed by an organization acceptable to the Minister or he may have the evaluation performed by RDA staff, or the applicant. In any event, the evaluation complete with necessary documentation, shall be reviewed and approved or rejected by the RDA and processed as indicated in paragraphs 5(e), (f) and (g).

(d) The evaluation shall normally be performed at the applicant's premises using the checklist and instructions at Appendix A. The kit should be evaluated in the exact configuration supplied to the owner builder.

(e) If the total checkmarks in the "Builder" column is less than 51% of the total, the kit shall be rejected and the manufacturer so notified. The kit may however, be reworked by the manufacturer and subsequently re-evaluated.

(f) If the total checkmarks in the "Builder" column is 51% or more of the total, the documentation will be submitted to Transport Canada Aviation (Airworthiness Branch) for approval.

(g) The documentation shall include:

- (i) completed checklist (Appendix A),
- (ii) a copy of the kit manufacturers parts list, or equivalent, exactly as sold with the kit; and
- (iii) a recommendation for acceptance as meeting the Major Portion requirement.

Note: applicants shall identify each page of the parts list by date and/or revision level. This will establish the configuration of the kit as evaluated.

(h) Based upon the recommendation of the RDA, Transport Canada Aviation will issue a statement (Appendix B) to the manufacturer/applicant that the kit meets the Major Portion requirement and is eligible for registration in the amateur-built category. Kit manufacturers/ applicants should be aware that any changes to the configuration or contents of the kit and parts list may affect the eligibility of the kit and may require a  evaluation.

(i) After an aircraft kit has been found eligible, changes to the kit will be reassessed by the original Regional Office. Major changes which decrease the amount of fabrication and assembly required by the builder may affect eligibility. Changes which consist of substitution of materials, parts, fasteners, etc. normally do not affect eligibility. Derivative models, which are developed from kits previously found eligible, may be determined to be eligible based on inspection and evaluation of the original kit, and evaluation of detailed documentation of the changes submitted by the kit manufacturer.

6. List of Eligible Kits

A list of eligible kits is available at Transport Canada Regional and District Offices. This list also includes kits found eligible by the FAA as meeting the requirements of FAR 21.191(g) (Major Portion Requirement) after vetting by Transport Canada.

Maher Khouzam
Chief, Airworthiness Standards
Airworthiness Branch

Information Note:

The purpose of the Checklist is to record the amount of fabrication and assembly accomplished by the kit manufacturer, and the fabrication and assembly necessary for the builder to complete the aircraft.

The numbers derived from the "manufacturer" and "builder" columns on the checklist indicate the percentage of the aircraft fabricated and assembled by the manufacturer and the builder. To meet the requirements of Chapter 549 the sum total in the builder's column must be greater than in the manufacturer's.

It is not necessary that a major portion of the individual parts be fabricated by the builder. If there is some work; i.e., trimming, measuring, cutting, drilling, gluing, layup, etc., required to prepare the individual part for installation/assembly into the aircraft, and if this work is performed on a representative number of parts listed under each applicable section of the aircraft, the kit would be considered eligible, as long as fabrication and assembly make up the "major portion".

As used in this AMA:

"fabricate" means to make or construct parts or assemblies from raw materials or other parts. This involves operations such as measuring, cutting, drilling, bending, welding, riveting, gluing, bonding, etc. It also involves operations such as soldering, crimping, swaging, "covering" and painting.

"assemble" means to fasten parts or assemblies together, using screws, bolts, nuts, or other mechanical fasteners.

Instruction for Completing Checklist

- 1. Enter the kit manufacturer's company name and address.*
- 2. Enter model of kit by name and/or number.*
- 3. List the latest date or revision date of kit parts list.*
- 4. Enter type of aircraft (land, sea, fixed-wing, rotorcraft etc.).*
- 5. Enter the date of the evaluation.*
- 6. Review each operation for its applicability to the kit under evaluation.*
- 7. Check the respective block under "accomplished by" (manufacturer, or builder).*

8. *Enter any operations not on list in blank spaces.*
9. *If the operation is not applicable to the kit construction enter "N/A" in the respective blocks.*
10. *Operations that are accomplished by other manufacturers or suppliers are to be checked in the kit manufacturer block.*
11. *Only special tools and fixtures, (i.e., jigs, templates, etc.) fabricated by the builder will be give credit. (No credit for hand tools).*
12. *When the evaluation is complete the total check marks are to be entered in the respective blocks on page 3 of the checklist.*
13. *Sign and date the checklist.*

Instructions For Determining Totals To Complete An Amateur-Built Aircraft Kit, using the Checklist at Annex A.

- a. For each item on the checklist (Annex A) that is accomplished by the manufacturer, a checkmark is entered under the "KIT MANUFACTURED" column. This should not include jigs, special fixtures, etc.
- b. For each item that is fabricated or installed by the amateur-builder, a checkmark is entered under the "AMATEUR BUILDER" column. This can include jigs and fixtures that would be necessary for the amateur-builder to make in the fabrication of the aircraft or components thereof.
- c. When this is completed for the aircraft the two columns are totalled and the percentage of checkmarks in the "AMATEUR BUILDER" column determined.

FABRICATION/ASSEMBLY OPERATION CHECKLIST		
Company Name		
Address		
Aircraft Model	Parts List Date	
Type of Aircraft		
	Accomplished by	
	Kit Mfr	Builder
FUSELAGE		
1. Fabricate Special Tools or Fixtures		
2. Fabricate Longitudinal Members, Cores or Shells		
3. Fabricate Bulkheads or Cross Members		
4. Assemble Fuselage Basic Structure		
5. Fabricate Brackets and Fittings		
6. Install Brackets and Fittings		
7. Fabricate Flight Control System Components		
8. Install Flight Control System Components		
9. Fabricate Cables, Wires and Lines		
10. Install Cables, Wires and Lines		
11. Fabricate Fuselage Covering or Skin		
12. Install Fuselage Covering or Skin		
13. Fabricate Windshield/Windows/Canopy		
14. Install Windshield/Windows/Canopy		
WINGS		
1. Fabricate Special Tools or Fixtures		
2. Fabricate Wing Spars		
3. Fabricate Wing Ribs or Cores		
4. Fabricate Wing Leading and Trailing Edge		
5. Fabricate Drag/Anti-Drag Truss Members		
6. Fabricate Wing Brackets and Fittings		
7. Fabricate Wing Tips		
8. Assemble Basic Wing Structures		
9. Install Wing Leading/Trailing Edge and Tips		
10. Install Wing Ailerons		
11. Install Wing Drag/Anti-Drag Truss		
12. Fabricate Cables, Wires and Lines		
13. Install Cables, Wires and Lines		
14. Fabricate Flight Control System Components		
15. Install Flight Control System Components		
16. Fabricate Wing Covering or Skin		
17. Install Wing Covering or Skin		
18. Fabricate Wing Struts/Wires		
19. Install and Rig Wings and Struts		
20. Fabricate Wing Flaps and Spoilers		
21. Install Wing Flaps and Spoilers		
AILERONS		
1. Fabricate Aileron Spars		
2. Fabricate Aileron Ribs or Cores		
3. Fabricate Aileron Leading and Trailing Edge		
4. Fabricate Aileron Brackets and Fittings		
5. Assemble Basic Aileron Structures		

FABRICATION/ASSEMBLY OPERATION CHECK LIST (Continued)

	Accomplished By	
	Kit Mfr	Builder
AILERONS (Continued)		
6. Install Aileron Leading/Trailing Edge and Tips		
7. Install Aileron Fittings		
8. Fabricate Aileron Covering or Skin		
9. Install Aileron Covering or Skin		
10. Install and Rig Wings and Struts		
EMPENNAGE		
1. Fabricate Special Tools or Fixtures		
2. Fabricate Spars		
3. Fabricate Ribs or Cores		
4. Fabricate Leading and Trailing Edges		
5. Fabricate Tips		
6. Fabricate Brackets and Fittings		
7. Assemble Empennage Structure		
8. Install Leading/Trailing Edges and Tips		
9. Install Fittings		
10. Fabricate Cables, Wires and Lines		
11. Install Cables, Wires and Lines		
12. Fabricate Empennage Covering or Skin		
13. Install Empennage Covering or Skin		
14. Install and Rig Empennage		
CANARD		
1. Fabricate Canard		
2. Assemble Canard Structures		
3. Install and Rig Canard		
LANDING GEAR		
1. Fabricate Special Tools or Fixtures		
2. Fabricate Struts		
3. Fabricate Brakes System		
4. Fabricate Retraction System		
5. Fabricate Cables, Wires and Lines		
6. Assemble Wheels, Brakes, Tires, Landing Gear		
7. Install Landing Gear System Components Above		
PROPULSION		
1. Fabricate Special Tools or Fixtures		
2. Fabricate Engine Mount		
3. Fabricate Engine Cooling System/Baffles		
4. Fabricate Induction System		
5. Fabricate Exhaust System		
6. Fabricate Engine Controls		
7. Fabricate Brackets and Fittings		
8. Fabricate Cables, Wires and Lines		
9. Assemble Engine		
10. Install Engine and Items Listed Above		
11. Fabricate Engine Cowling		
12. Install Engine Cowling		
13. Fabricate Propeller		

FABRICATION/ASSEMBLY OPERATION CHECK LIST (Continued)

	Accomplished By	
	Kit Mfr	Builder
PROPULSION (Continued)		
14. Install Propeller		
15. Fabricate Fuel Tank		
16. Install Fuel Tank		
17. Fabricate Fuel System Components		
18. Install Fuel System Components		
HELICOPTER MAIN ROTOR DRIVE SYSTEMS AND CONTROL MECHANISM(S)		
1. Fabricate Special Static and Dynamic Main Rotor Rigging Tools		
2. Fabricate/Assemble Main Rotor Drive Train		
3. Install Main Rotor Drive Train Assembly		
4. Fabricate/Assemble Main Rotor Shaft and Hub Assembly		
5. Install Main Rotor Shaft and Hub Assembly		
6. Align Main Rotor Shaft Drive Train, Shaft and Hub Assembly		
7. Fabricate Main Rotor Rotating Controls		
8. Install Main Rotor Rotating Controls		
9. Fabricate Main Rotor Non-Rotating Controls		
10. Rig Main Rotor Rotating and Non-Rotating Controls		
11. Fabricate Main Rotor Blades		
12. Install Main Rotor Blades on Rotor Hub		
13. Statically Balance and Rig Main Rotor System		
14. Dynamically Track and Balance Main Rotor System		
HELICOPTER TAIL ROTOR DRIVE SYSTEMS AND CONTROL MECHANISM(S)		
1. Fabricate Special Static Tail Rotor Rigging Tools		
2. Fabricate Vertical Trim Fin		
3. Install Vertical Trim Fin		
4. Fabricate Horizontal Trim Fin		
5. Install Horizontal Trim Fin		
6. Fabricate Tail Rotor Drive System		
7. Install Tail Rotor Drive System		
8. Fabricate Tail Cone or Frame		
9. Install Tail Cone or Frame		
10. Rig Vertical and Horizontal Fins		
11. Fabricate Tail Rotor Shaft and Hub Assembly		
12. Install Tail Rotor Shaft and Hub Assembly		
13. Fabricate Tail Rotor Rotating and Non-Rotating Controls		
14. Rig Tail Rotor Rotating and Non-Rotating Controls		
15. Fabricate/Assemble Tail Rotor Blades		
16. Install Tail Rotor Blades		
17. Statically Balance and Rig Tail Rotor System		
18. Dynamically Track and Balance Tail Rotor System		
COCKPIT/INTERIOR		
1. Fabricate Instrument Panel		
2. Install Instrument Panel and Instruments		
3. Fabricate Seats		
4. Install Seats		
5. Fabricate Electrical Wiring, Controls/Switches		
6. Install Electrical System Controls/Switches		
TOTALS		

Sample Letter To Applicant when Kit Is Determined To Be Eligible

Applicant's Name

Address

Dear Sir:

Transport Canada Aviation has completed evaluation of the (Aircraft Model) kit. We have determined that the kit, as evaluated at your facility on (date), and defined by parts list (date/revision) meets the intent of Chapter 549 (Section 549.5) of the Airworthiness Manual. "The major portion of the aircraft (more than 50%) is fabricated from raw material and assembled by an individual or a group of individuals on a non-commercial, non-production basis for educational or recreational purposes".

This evaluation should not be construed to mean that the kit is "certified," "certificated", or "approved" and it is not appropriate to represent it as such. It may be represented as eligible for construction as an amateur-built aircraft under the provisions of Chapter 549 of the Airworthiness Manual.

Copies of the kit parts list, identified by date and/or revision, shall be provided with kits supplied to customers. This will assist the builders in identifying the configuration of the kits for the final approval of the completed aircraft. Any changes to the configuration or contents of the kits and parts lists may affect the eligibility of the kits.