Role and Responsibilities of the Aircraft Owner

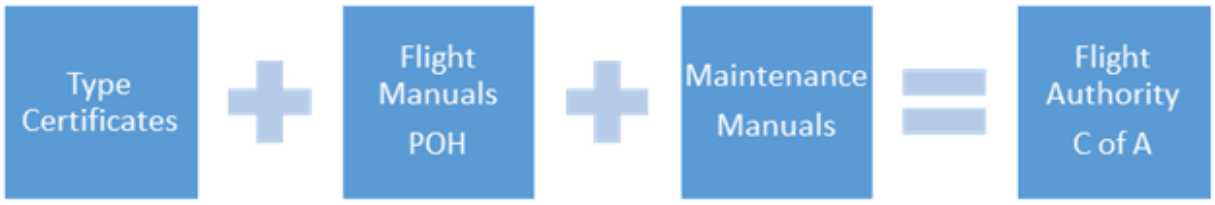
This document aims to discuss the role and responsibilities of private aircraft owners in General Aviation. It would appear that not all aircraft owners understand their role and responsibilities with respect to aircraft ownership. Aircraft maintenance is an area where this appears to be particularly evident. Maintenance constitutes an important aspect of aircraft ownership. An aircraft owner's role and responsibilities also constitute another important aspect of this relationship. Misunderstanding these aspects and their implications typically leads to uncomfortable situations that usually manifest themselves when the AME presents the owner with the invoice for the aircraft's annual inspection. Yet, the owner is fully responsible for the maintenance of his aircraft; what, how often, how extensive, etc. The AME is responsible for the quality of the work done on the aircraft.

Maintenance and Airworthiness

Aircraft maintenance and the airworthiness of the aircraft are very closely related. In fact, the primary purpose of the aircraft maintenance, carried out in accordance with the Maintenance Program defined by the aircraft manufacturer, is to ensured that the airworthiness of the aircraft is maintained such that the condition of the aircraft is always in accordance with its Type Design. In the case of an aircraft, and in accordance with CAR 101, airworthiness means in a fit and safe state for flight and in conformity with its Type Design. The aircraft's Flight Authority allows the aircraft to fly legally. This Flight Authority can exist under different forms, primarily as a Certificate of Airworthiness (C of A), or as a Special Certificate of Airworthiness (SC of A). Both forms will be discussed in this paper.

Certificate of Airworthiness (C of A)

The following diagram illustrates how Maintenance and Airworthiness relate to each other and what this means for the aircraft owner.



A certified aircraft is built to an approved design, otherwise known as a 'Approved Type Design'. Eventually, after extensive and expensive developmental and certification flight testing, this aircraft is certified and receives its 'Type Certificate'. Aircraft manufactured in accordance with that Type Certificate are issued a 'Flight Authority' also known as 'Certificate of Airworthiness' or C of A. Be aware though that the owner of the aircraft is responsible to ensure that the

validity of the C of A is maintained, and that there are circumstances where the C of A might lose its validity. And it is illegal to fly a certified aircraft without a valid C of A.

In order to facilitate the task of ensuring the continued validity of the C of A, the manufacturer provides a flight manual commonly known as the Aircraft Flight Manual (AFM) or the Pilot Operating Handbook (POH). These manuals guide the pilot in the operation of the aircraft and intend to ensure that the pilot always operates the aircraft within the limits of its design, or within the Flight Envelope. As the pilot operates the aircraft, within its flight envelope, wear and tear appear, degrading the condition and overall performance and reliability of the aircraft to the extent where the C of A could become invalid. Adequate maintenance of the aircraft is then required to maintain the validity of the C of A. The manufacturer provides a Maintenance Manual to this effect. Regular maintenance performed in accordance with the Maintenance Manual protects the aircraft condition and performance from degrading to an unacceptable level with respect to its Type Design. In the event of failure of some component, the aircraft must be repaired in accordance with the Maintenance Manual. This Maintenance Manual is typically supplemented by other documentation such Advisory Circulars (AC) or other guidance materiel or instructions on how to carry out the work. Except for a few minor items of maintenance described in the Canadian Aviation Regulations (CAR's), the maintenance of a certified aircraft is the exclusive domain of qualified and licensed personnel known as the Aircraft Maintenance Engineer or AME. The Maintenance Manual also provides the necessary information for a qualified person to perform routine maintenance on the aircraft, such as snag repairs, annual inspection, regular inspections based on usage, and numerous other elements. These strict requirements ensure that a properly maintained certified aircraft remains almost factory new from the perspective of ''fit and safe to fly'' and that it actually retains its value over time. Not so with our expensive road vehicles.

In addition to the routine maintenance discussed above, we also have scheduled inspections. The Annual is one of these scheduled inspections and we will limit our discussion to this one. The Annual is actually far more than just an opportunity to give our favorite AME a nice cheque. No matter how many hours our aircraft has flown during the year, be it zero hours or a few dozens of hours, and even if no snag appeared or no maintenance or a lot of maintenance was required, the Annual is still necessary. Any maintenance carried out during the year addresses issues that require attention at the time. But numerous other items can and do degrade over time and they require attention. Any normal maintenance action might not typically address these issues. The manufacturer defines what the Annual Inspection must investigate and address as appropriate. Imagine the scenario where an owner brings an aircraft for its Annual. The AME is responsible for carrying out the annual inspection as per the manufacturer's instructions and sign off the annual as per the CARs. This AME signature only certifies that the work has been carried out as per appropriate instruction and that the aircraft fit and safe to fly in accordance with the regulation as it pertains to the Annual. The AME is not responsible for carrying out an extensive inspection of the aircraft beyond the manufacturer's instructions or the CARs for the annual. The owner is responsible to tell the AME what this owner wants the AME to do in excess of the annual. Typically, when an AME notices something that should be looked into further, the AME will notify the owner, but the owner is responsible to decide if the

issue will be addressed or not. A good AME will typically inform the owner of any identified discrepancies that require attention, applicable ADs that should be incorporated, and/or other things that might invalidate the aircraft C of A despite the fact that the annual was completed and signed off. The major point here is that one could have an aircraft with the annual just completed and signed off, yet not have a valid C of A because some issue(s) not covered by the annual still require attention.

Next to normal use of the aircraft, a variety of events and circumstances can also invalidate the C of A. The first instance that comes to mind is when the pilot does not operate the aircraft in accordance with the Pilot Operating Handbook (POH) or Aircraft Flight Manual (AFM). When a pilot does not respect the POH, that pilot operates the aircraft outside of the capabilities defined in the Type Design, in a region where the aircraft has not been tested and certificated, known as the Flight Envelope. In other words, that pilot now becomes a developmental test pilot and operates an aircraft that suddenly does not have a valid C of A. Granted, that flight testing stint may be quite short, for instance, operating over gross, exceeding flap speed or landing gear speed, spinning an aircraft when the POH states that 'Intentional Spins Are Prohibited', or other similar situations. Of course, when the pilot comes back within the Flight Envelope, the C of A is valid again, at least from the operating perspective. Any such event could have a negative impact on the aircraft itself. If any of the speed limits were exceeded, or an unapproved spin was performed, the aircraft was likely subjected to undue loads, overstress, or other undesirable circumstances that could affect its 'fit to fly' status. In extreme cases, some surfaces could be deformed for instance. Enters the next step: Maintenance. If the aircraft was subjected to these undue loads, the aircraft must be looked over for potential damage, like wrinkled skin, popped rivets, distorted surfaces, or other typical signs. The AME who will inspect this aircraft will rely on the 'Maintenance Manual', published by the manufacturer, to do his or her job. This same Maintenance Manual provides guidance to assess and repair an overstressed or otherwise damaged aircraft, and spells out the requirements for the aircraft to be maintained such that it always meets its type design and for its C of A to remain valid after such occurrences. One can just imagine if our cars were subject to such tight controls, how long they would last, how slow their design would progress (yeah, no electronic nannies), but also how much they would cost. Bottom line, for a certificated aircraft to fly legally, it must have a valid Flight Authority usually referred to as a Certificate of Airworthiness or C of A.

Airworthiness Directives, Service Bulletins and Advisory Circulars

Beyond the owner's responsibilities with respect to the maintenance of the aircraft and its airworthiness as discussed above, other events may occur in service that could influence the airworthiness of the aircraft and hence the validity of a C of A. A typical example would be when a component of the aircraft is identified as not satisfying the requirements of the 'Approved Type Design'. May be this component does not perform as intended, or fails too early with unacceptable safety consequences, or actually fails to satisfy its design requirements

due to some design error, or any of numerous reasons. These situations generate a safety risk in the operation of the aircraft and must be remedied, either through some degree of redesign, changes to the manufacturing process, or some other mitigating method such as more frequent inspections and maintenance related to this component. We can recall the cases where some aircraft types exhibited issues with a structural component such as the main spar for instance.

An **Airworthiness Directive (AD)** normally addresses these types of situations. The National Aviation Authority (NAA) where the manufacturer is based, or TCCA, our own NAA in Canada, will issue an AD addressing the situation. The AD will identify the aircraft, engine, propellers, and/or components affected, define the issue of concern, specify the actions required to remedy the situation and thus maintain the validity of the C of A. The actions imposed by the AD can include more frequent inspections, the implementation of an approved modification to the aircraft, or the replacement of the failing component with one of better design and manufacture. The owner of the aircraft is responsible for the implementation of the AD to his/her aircraft. The AME is not responsible for this initiative. Granted, a good AME will be aware of any AD applicable to the owner's aircraft and what this AD entails, in all its details, and would typically advise the owner at the annual visit, of this AD and would inquire if the owner wants the AD implemented. The choice to implement or not the AD remains with the owner as this owner may choose to do the annual with one AME but go somewhere else to have the AD implemented on his aircraft. This does not preclude this AME from carrying out the annual and signing it off in the aircraft logbook. The AME will only carryout the AD if the owner requests the AME to do so.

Owners must be careful and understand the subtleties here: the annual is an inspection accomplished as per the aircraft maintenance manual. ADs are additional to and independent form, the annual. Should an AD require implementation by the time the aircraft comes out of annual, the annual can be signed off properly and the aircraft released to service but if the AD is not done, the aircraft C of A is not valid. It is then illegal to fly this aircraft until the AD is done and signed off by competent personnel. A good AME will inform the owner of this situation but the final decision with respect to the AD rests with the owner. The AME does not have the responsibility to police such situations, the responsibility rests with owner, nobody else.

A **Service Bulletin (SB)** is similar in perspective to the AD except that it is not compulsory. When an issue arises that requires attention but is not safety critical, the interested parties will opt for the SB. The SB informs owners of a situation requiring attention, the details of the issue is, and the implications. The SB and will offer one or more solutions to address the issue, which may include the replacement of some parts. The owner does not have to comply with the SB but it is generally a good idea to do so. A **Service Letter (SL)** follows a similar pattern as the **SB** but is limited to providing information.

An **Advisory Circular (AC)** intends to clarify some aspect of the regulations and to provide guidance relative the interpretation of said regulation. ACs are issued by TCCA and provide this information for the benefit of aircraft owners, AMEs, as well airworthiness inspectors.

Major and Minor Modifications, STCs

TCCA provides for the modification of an aircraft while maintaining the validity of its C of A through the implementation of a Major Modification or a Minor Modification. The significant difference between the two types of modifications relates to the depth of data required to support the modification. A **Major Modification** requires 'Approved Data' typically known as a **Supplemental Type Certificate (STC)**. An STC constitutes a genuine modification to the Approved Type Design of an aircraft. Such a modification may impact the requirements for airworthiness and the associated guidance and directives in the Maintenance Manual. In most cases, an AME can install an STC. A **Minor Modification** requires only 'Acceptable Data'. A product manufacturer drawing or the installation instructions for a product constitute 'Acceptable Data'. If this is specialized work, an appropriately rated AMO would be required for the performance of that work. TCCA gives the authority to the AME who will sign the paperwork and the aircraft to decide if the intended modification is Major or Minor. CAR 571, Appendix A provides excellent guidance to the experienced AME to assess if a modification in major or minor. This appendix presents a list of questions for assessment. If any question requires a 'Yes' answer, the modification is Major, otherwise we have a Minor modification. A very simple and efficient process that sadly enough does not work very well. Some AMEs may not be aware of the modification classification process (CAR 571 Appendix A). It is important that you be aware and are prepared so that you can have informative discussions with the maintenance personnel concerning your aircraft maintenance requests and expectations.

Airworthiness Limitations, Instructions for Continued Airworthiness

An **Airworthiness Limitation** is typically a constraint in the form of a life limit or a maintenance task that is mandatory as a condition of a C of A. It can be incorporated as integral part of the C of A, or as a result of an AD.

Instructions for Continued Airworthiness (ICA) are typically associated with an STC and make up an integral part of that STC. These ICAs carry the same importance as if they had been issued by the aircraft manufacturer when the aircraft was released to its first owner and must be incorporated in the Maintenance Program of the aircraft. The incorporation of several STCs over the life of an aircraft can potentially lead to a significantly increased maintenance burden when compared to the maintenance program originally released by the manufacturer.

Special Certificate of Airworthiness (SC of A)

The CARs provide for some aircraft to operate without a Certificate of Airworthiness as discussed above when they do not meet all the requirements for such a C of A. These aircraft typically operate under a **Special Certificate of Airworthiness**. Relative to the discussion above, these aircraft do not have an Approved Type Design and thus no Type Certificate as defined in the CARs. The Special Certificate of Airworthiness a provides for four different categories. The most common of these categories is most likely the **Amateur-built** aircraft. Another category

gaining in popularity is the **Owner-Maintained** aircraft. Finally, we also have the **Restricted** and the **Limited** categories.

It should be noted that even though these aircraft might not all have an Approved Type Design nor a Type Certificate in accordance with our CARs, they nonetheless follow the same process illustrated in the diagram shown at the beginning of this article. In the case of these aircraft, the components of this process do however vary to some degree from the ones that constitute integral parts of the process upon which a certified aircraft obtains a C of A and how the validity of this C of A is maintained. These variations in the documentation and associated components of the process will be discuss further, in relation to each category.

Amateur-built

The CARs provide for one to build his/her own aircraft. The variety of Amateur-built aircraft ranges from the basic open cockpit wood and fabric aircraft to the complex, high performance aircraft sporting a constant-speed propeller, retractable gear, oxygen system, fully IFR aircraft and of course the costs vary accordingly. While these amateur-built aircraft do not have an Approved Type Design nor a Type Certificate, they nonetheless are built to a design. Some designs are original work from the builder, some builders buy plans, some owners buy fast build kit, but all these aircraft do have a design. As these aircraft are built in small numbers, often as one-offs by some enthusiasts, the effort and costs preclude going through the process of getting the design approved in the context of the CARs. The aircraft still requires to be fit and safe for flight in order to obtain a Flight Authority and this starts at the design stage.

Nevertheless, these amateur-built aircraft still do have a Pilot's Manual, at least in minimal form, to provide the pilot reasonable guidance as to the operation of the aircraft and its systems as well as the emergency procedures. They also have some documentation, at least minimal, relating to their maintenance requirements and procedures. The degree of details and the extent of information provided in these versions of a Pilot's Manual and a Maintenance Manual vary with the complexity of the aircraft and its systems as well as with the degree of professionalism and dedication of the builder.

Since amateur-built aircraft do not have a C of A, they are not subject to ADs, SBs, SLs, STCs, etc. Additionally, as mentioned earlier, amateur-built aircraft are one-offs, meaning that no two of the same type can be considered to be alike. Consequently, all this documentation relevant to certified aircraft would constitute a nightmarish logistical problem in the amateur-built world. Despite this situation, amateur-built owners and operators are expected to operate and maintain their aircraft in accordance with best practices and recognized procedures. While an original design built as a single unit by the designer/builder/owner could be operated quite safely with the skimpiest of documentation by this same individual, we also have, at the other extreme, the RV fleet of aircraft where the designer/kit manufacturer provides documentation, guidance, and in-service follow-up almost equivalent to that of certified aircraft.

Despite the differences in depth of documentation and manufacturer guidance and support, amateur-built aircraft do follow the same process as illustrated in the diagram at the beginning of this article, to an admittedly less restrictive fashion as compared with the certified aircraft. And the owner is specifically responsible to ensure that his or her aircraft is fit and safe for flight in accordance with this process.

Owner-Maintenance

The Owner-Maintenance category has been created in recent years as a means of enabling dedicated owners of older aircraft, for which parts and manufacturer support may be difficult or outright impossible to find, to keep flying them at a reasonable cost. These aircraft were all built to an Approved Type Design, had a Type Certificate, a Pilot Manual, a Maintenance Manual, and a Certificate of Airworthiness. As Certified Aircraft, they were maintained by AMEs in accordance with the CARs. As the name of their category indicates, these aircraft are now maintained by their owners and cannot hold a C of A. These aircraft must still remain fit and safe to fly and the best approach to achieving this would be for the owner to operate and maintain this airplane in accordance with the documentation and guidance that the manufacturer originally provided, as amended over the life of the aircraft, and used for all those years. Since these aircraft now operate on an SC of A, they are not subject to ADs, SBs, SLs, STCs, etc., but given the reasons why they are in the Owner-Maintained category, no more manufacturer support, it would be highly unlikely that some new documentation of that type would come out. However, the owner is strongly encouraged to follow the practices and procedures that were in place originally, as much as possible of course.

TCCA has established a list of aircraft eligible for approval in the Owner-Maintenance category. Only non-complex aircraft are eligible: fixed pitch propeller, fixed landing gear, single engine. Once an aircraft has been operated in the Owner-Maintenance category, it would be very complicated to revert to its previous status of certified aircraft. Essentially, this aircraft has strayed away from its Type Certificate and the extent of this margin would define what is required to come back to its Type Certificate. Owner-Maintained aircraft are not approved by the FAA for flight in the US.

Restricted

An SC of A is typically issued for an aircraft which has a Type Certificate in the **Restricted** category, or an aircraft that has been modified in such a manner that it no longer complies with the basis of its original Type Certificate. These aircraft include: aerial advertising other than banner towing, aerial firefighting, aerial photography and survey, aerial application services, or any other similar services.

Since these aircraft began life with a Type Certificate, they do follow the full process as discussed with respect to certified aircraft holding a normal/standard C of A. As these aircraft are in the realm of specialized roles or mission not encountered by the typical GA aircraft

owner/pilot, they are outside the boundaries of this document. The interested reader is referred to any knowledgeable AME or their local TCCA Inspector for further information.

Limited

A typical, but not necessarily exclusive, example of an SC of A in the **Limited** category would be an ex-military aircraft, commonly referred to as a Warbird. These aircraft follow the process described at the beginning of this paper with the equivalent attention and accuracy as any certified aircraft. The major difference is that these aircraft, whilst having a Type Design in its truest form, do not have a Type Certificate, and thus never make it to a C of A. Considering that the role of a fighter aircraft is to go into combat, and face the likelihood of not returning to base, the cost and effort of obtaining a Type Certificate has always been considered superfluous by both the designer/manufacturer and the customer, better known as the Military. Civilian authorities have no say in this. All parties are nonetheless sincerely interested in these aircraft being kept fit and safe for flight, hence their adherence to the process previously discussed.

When an ex-military aircraft is brought onto the civilian registry and becomes a Warbird, an **SC of A – Limited** is issued with respect to this aircraft when the Minister is satisfied that the aircraft has been maintained to standards acceptable to the Minister and which afford a level of safety at least equivalent to that provided by the maintenance standards of Chapter 571 of the CARs, and when the aircraft has been subjected to evaluation leading to its acceptance by the Minister. At that point, the owner/operator takes on the role and responsibilities associated with maintaining the aircraft in a fit and safe to fly state as described throughout this document. Further information can be obtained for your friendly TCCA inspector.

Aircraft Journey Log and Technical Log

Regardless of the type of Flight Authority issued to any aircraft, the aircraft owner is responsible to keep accurate records of the aircraft utilization and maintenance. In this regard the Aircraft Journey Log constitutes the primary, or master document. The tech logs are the backup version should the Journey Log be lost. The tech records should cover up to two years or until the last inspection is repeated. Most owners keep everything. The owner is responsible for the tech logs and the accuracy of their content. Most owners rely on their AME or AMO for the upkeep of their tech logs, usually for a fee. These aircraft records should be kept in a dry secured area, electronic records should be backed up regularly.

The TCCA aircraft file contains minimal information such as: records of annual inspections as reported on the AAIR or in the past at the C of A annual renewal if received from the owner. The TCCA aircraft file would consist of modifications records, flight permits records applications fees, C of A flight authority and registration docs application fees, TC inspections, if applicable other info depending upon what was supplied by the owner. The AC file is closed once the aircraft leaves the civil registry. The file goes into the archives in Ottawa or other sites, and

eventually on micro fiche. One can possibly obtain such a file under the Access to Information process.