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## Information Paper

# EXPERIMENTAL INFO for LAMEs

*This information paper provides guidance to LAMEs who want to know more about Amateur-Built Experimental aircraft.*

### 1. Introduction:

Some LAMEs have had not a lot, or none at all, involvement with Amateur Built Experimental (ABE) aircraft. This information paper hopes to answer some of the most common questions, and maybe shoot down some myths about the Amateur Built Experimental scene.

### 2. What is “Experimental”?

First up, there is no “*Experimental Category*” in Australia. As a **category** of Certificate of Airworthiness, it doesn’t exist.

**Experimental** is simply a designated type of Special Certificate of Airworthiness, commonly called an *Experimental Certificate*, which can be issued for all sorts of purposes, with Amateur Built aircraft being just one of them. CASR 21.191 onwards describes more. SAAA Amateur Built Experimental aircraft come under CASR 21.191(g). That’s it – no others. Even aircraft constructed from a kit (like RV’s and others) come under 21.191(g).

### 3. Some CASA References

- CASR 1998 PART 21 – Regs 21.191 to 21.195b.
- AC 21.4 – Amateur-Built Experimental aircraft certification
- AC 21.10 - Experimental Certificates
- AC 21.29 - Commercial Assistance During Construction of Amateur Built Experimental Aircraft
- CAR 262AP Experimental aircraft - operating limitations.



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#### 4. Description of an Amateur Built Experimental Aircraft

Amateur-Built Experimental aircraft are usually meticulously built to fit and finish standards far greater than a certified aircraft ever could be.

Amateur Built Experimental aircraft are not required to conform to *any* recognised design or construction standards. You can build anything you like, out of anything you like, and power it with anything you like. Of course, most people use aviation grade materials and parts and recognised designs. But they don't have to.

So how do we cope with all that? Quite easily actually. When a person receives an Experimental Certificate, the certificate contains operating conditions and limitations composed in order to protect third parties on the ground or water who are not involved in the activity. No provision is included to protect the pilot as he or she is an informed participant in the activity, as are their passengers. Test flying must be done not over populous areas.

Now if, say, there was an aircraft made of wood-yard timber, powered with a modified industrial engine, and had a hand-whittled propeller, the operating conditions would be appropriate for *that* aircraft and would likely be along the lines of "only to be flown from a named remote airfield, away from housing/built-up areas" and the like, and would likely be very restrictive.

On the other hand, a well made aircraft made from a proven kit using a Lycoming engine will have quite a different suite of operating conditions and limitations. Far less onerous, but still, appropriate for *that* aircraft. Each aircraft is evaluated individually.

The more truly "Experimental" an aircraft is, the more the builder will have to accept the dealt operating conditions and limitations. That's how "Experimental" is kept safe for the non-involved.

Permission to operate an Experimental Aircraft over built-up areas (also known as populated areas) is handled by a separate approval under CAR262AP(5) – *if* the Authorised Person issuing it sees fit **and** may involve certain conditions or limitations in itself.

Permission to operate "other than day VFR" is handled by CAR 262AP(6), and means NVFR and or IFR flight is permitted, once again *if* the Authorised Person sees fit **and** the aircraft has the appropriate equipment for those types of flights. TSO'd equipment is not required for IFR, but the equipment must meet all other normal IFR requirements. AC 21-46 *Airworthiness approval of avionics equipment* applies only to type certified aircraft.

Experimental version engines are common. These are otherwise known as Lycoming clones, some are even made at the Lycoming factory as THUNDEBOLT Experimental engines, meaning, not a certified variety. These often have upgraded features not found in the certified engines. That does not make them any less safe. Thousands of these clone engines fly every day.



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## 5. How does an Experimental Aircraft arrive on the scene?

Here is a quick run-down:

- No permission to begin building is required, from anyone. SAAA membership is not mandatory but is of course very worthwhile.
- Person commences building the aircraft – from a kit, plans, whatever.
- They are free to incorporate any changes or modifications they like during the construction. Those changes **do not** require CASR 21.M engineering approvals (*that's the new name for the old "CAR 35" Engineer.*) Why? Because it is being built as an Experimental. No design standards are mandated.
- SAAA Volunteer experienced builders called Technical Counsellors can be invited to see SAAA member aircraft being constructed and offer their advice. They do not "approve" or "sign off" anything – that is solely the builders domain.
- When the aircraft is completed, the builder should invite their Technical Counsellor and other experienced builders to thoroughly go over the aircraft, looking for faults. Many also engage a LAME to do a thorough inspection – virtually an annual inspection.
- At the end, it is THE BUILDER who signs the paperwork, attesting that in their view, the aircraft is airworthy, or in other words, fit for test flights. How can that be? Well, it be. Think about an extreme "Experimental" aircraft – something of totally radical design, build, layout, powerplant, controls. How on earth could a qualified aeronautical professional say that it is "airworthy" or "not airworthy?" They couldn't. Before flying, the aircraft is considered to be airworthy by the builder, and, hopefully, **proven** to be airworthy after the test flying.
- Next, it's time to call in a CASA Authorised Person (A.P.) who will issue the Experimental Certificate. Often, this is an SAAA trained person. It is not the A.P.'s job to conduct a thorough airframe inspection. That is the builder's job. The A.P. is there primarily for two reasons. Firstly, to see if the presented aircraft is actually eligible according to the Part 21 Regs to receive an Experimental Certificate, and secondly, if so eligible, to compose suitable operating conditions and limitations within that Certificate. **That's it.** Many A.P.'s are LAMEs and will also perform some sort of inspection which assists them make their decisions. But it is **not** the A.P.'s job to thoroughly inspect the aircraft looking at the nuts and bolts of it. The AP does not attest to "airworthiness" of any aircraft.



## 6. What do the Regs say on the matter?

**CASR 21.195A** says that:

- CASA or an authorised person **must** issue an experimental certificate if the applicant:
  - (a) is eligible for the certificate; **and**
  - (b) applies for the certificate; **and**
  - (c) is entitled to the certificate; **and**
  - (d) otherwise complies with certain things
- A condition imposed on an experimental certificate may include operational limitations.
- Any conditions imposed on an experimental certificate must be in writing.

Note the key word “**MUST.**”

If a person is **eligible** and **applies** and **complies**, an Experimental Certificate **must** be issued. Not “**may**” be issued, **must** be issued. That is the law, it’s not optional for the AP.

And part of that “**must**” is the operating conditions and limitations prescribed, even if they may appear harsh if the circumstances and aircraft dictate.

## 7. Maintenance

CASA issues a legislative instrument which permits builders of amateur-built experimental aircraft to maintain their aircraft, subject to a few conditions. The main one is that they must have completed a course of training, and one such course (which is actually the only course available) is the SAAA Maintenance Procedures Course. This is a two day course primarily on regulatory matters, not hands-on maintenance. CASA is satisfied that persons who build their own aircraft have gained the skills to also maintain it. What they lack in reality is all the regulatory knowledge about logbooks, record keeping, maintenance releases and so on. All aircraft must also have an Annual Inspection, just like their certified counterparts do.

## 8. Modifications?

During the build process, persons are free to “experiment” and change things as desired with no approvals from anybody for anything.

After the plane is flying – different matter.....

If the **builder** makes a change that has “**a significant effect**” on weight & balance, structural strength, performance or operational characteristics, they must make contact with CASA or an Authorised Person before the aircraft is again flown, in order to have CASA or the Authorised Person decide whether the major modification is acceptable or if a new Experimental Certificate and Annex of operating conditions and limitations needs to be issued.

The **purchaser** of an Experimental Aircraft cannot do anything to the aircraft, as they were not the manufacturer. They could engage a LAME to do the work, and then they would be subject to the same procedure as detailed above for changes that have “a significant effect” on any of those matters.



## 9. Myths and Truths:

MYTH:	TRUTH:
"The Experimental Category"	There's no such category. "Experimental" is a type of Special Certificate of Airworthiness or Experimental Certificate.
A.P.'s who issue the Experimental Certificate conduct a thorough airworthiness inspection.	Not true. CASA only requires A.P.'s to confirm the aircraft is <b>eligible</b> for an Experimental Certificate, and then to compose suitable operating conditions and limitations.
Experimental Aircraft do not have to comply with any Airworthiness Directives.	Not true. Operators <b>must</b> comply with all Airworthiness Directives directed to the aircraft or powerplant or equipment, unless the AD specifically exempts aircraft with an Experimental Certificate.
Experimental Aircraft can be fully and freely maintained by the owner	True Proviso - CASA Regulations require certain pre-requisites which must be met in order for a person to qualify for those maintenance privileges.
Anything can be freely changed on an Experimental Aircraft, without consulting anybody.	Not true. CASA Regulations require certain matters to be disclosed (such as major changes) and for the aircraft to then be re-evaluated for operating conditions and limitations.
Anyone can buy an Experimental Aircraft and maintain it themselves.	Not true. CASA Regs do permit it in <b>some</b> cases such as where the owner has built "an essentially similar" aircraft.
Anyone can buy an Experimental Aircraft and freely modify it themselves and do whatever they like, nobody cares.	Not true. Modifications can be made by following applicable CASA Regs and exemptions.
Experimental aircraft cannot be used for flying training.	Not true. The owner of the aircraft may receive training in it.
Once a certified engine is installed in an Experimental aircraft, it instantly becomes "uncertified."	Not true. Proviso- Engines are maintained to the factory specifications (whether professionally or by the owner/builder).
Certified engines maintained by the owner instantly become "uncertified."	Not true. Proviso – That the owner is authorised (generically) by CASA to maintain the aircraft (including the engine) and they follow the factory publications.