



## Information Paper: “New Builders Information Pack”

*This information paper provides an Introduction to Amateur Built Experimental Aircraft and is intended for the person who is considering building an aeroplane, helicopter or other aircraft and would like to get an idea about what’s involved.*

### Foreword

If you are currently, or are soon to be, an aircraft builder, you should also seriously consider joining us at the SAAA... we aim to make it that you cannot afford ***not*** to be in SAAA!

The SAAA has done, and will continue to, negotiate and consult with CASA to allow us to be able to ***build, fly and maintain*** our own aircraft under the “Experimental” regulations. Without a recognized body to perform this, we builders would be nowhere! The SAAA were instrumental in achieving “EXPERIMENTAL” for Australia, and the ongoing support and membership from ***all*** builders will ensure the successful continuation of experimental building for all of us.

Other great reasons to join SAAA:

As of February 2003, SAAA achieved a ***major*** milestone (even by International standards) in getting additional experienced guys trained and subsequently authorised by CASA to conduct final inspections of amateur built experimental aircraft, and issue the Special Certificate of Airworthiness - Experimental. We have an **Air BP fuel carnet card** available, getting members ***6 cents per litre off*** the BP pump price, and early in 2004, SAAA introduced the **Flight Safety Assistance Program** – details on the website. We aim to make it that you cannot afford ***not*** be in SAAA!

## Building your own Aircraft - an overview:

### GENERAL COMMENTS

The 'old' Amateur Built system under regulation ANO 101.28 involved building your aircraft to an "Amateur Built Aircraft Acceptance" (ABAA). This was an aircraft type which had been thoroughly evaluated by CASA (*and other predecessors of "The Dept. of Changing Names"*) and resulted in an approved set of plans and drawings. Any modifications you wished to make had to have detailed drawings and specifications prepared and then be approved by a "Reg 35" aero engineer. Initial workshop approval and then building stage inspections under the watchful eye of CASA or SAAA representatives were mandatory and a very thorough final inspection of the completed aircraft took place. All maintenance on the completed aircraft had to be done by a licenced aircraft maintenance engineer (LAME).

### ENTER "EXPERIMENTAL".....

The 'new' system operates under CASR 1998 Part 21 introduced in Australia in 1998. *Special Certificates of Airworthiness – Experimental* can now be obtained, more commonly referred to as just "The Experimental Category" which is not really correct – it is not a "category" as such, it's a type of Special Certificate of Airworthiness for operating an amateur built aircraft.

### UNDER THESE REGULATIONS.....

*the builder of the aircraft is entirely responsible for airworthiness*



## Frequently asked questions:

### What's available to construct?

- Aeroplanes *and* helicopters from Kits
- Aeroplanes and helicopters built from plans only
- Purchase and complete a partially built project
- Construct *your own* design
- No seating limitations
- Any number and type of engines

### Where to source these aircraft?

- SAAA Chapter members
- Magazines:
  - Kitplanes
  - Custom Planes
  - Pacific Flyer
  - Australian Ultralights
- Websites:
  - [www.landings.com](http://www.landings.com) – homebuilts section
  - [www.homebuilt.org](http://www.homebuilt.org)
  - [www.kitplanes.com](http://www.kitplanes.com) - annual plans built directory issue
  - others: search under “homebuilt aircraft”

### Are they “approved” for Amateur Construction?

Under Australian “Experimental” regulations these days, *no formal approval is required to construct an aircraft*; you are free to select any design from Australia, overseas, or indeed design your own. You may construct anything you like, out of anything you like, and power it with anything you like; no exceptions. Of course, “aviation grade” parts and materials are preferred, and considered the standard.

### What's the catch?

Yes, there is one..... if your aircraft is of unconventional design, or has unproven features (powerplant for example) you may be restricted on *where* you may fly your aircraft initially, until such time as it is *proven* to be safe and fully controllable.

### Do I need a pilot's Licence?

To *build* one, no, but *to fly* one, yes! Minimum requirement of a Private Pilot's Licence with appropriate endorsements if the aircraft is registered as a General Aviation (G.A.) machine (“VH” registration)

### Flight Training in your own aircraft

*Yes*, this is possible, *if* you can find an instructor or flying school willing to do so. Of course, this is only after your aircraft has completed its test flying phases.

### **What materials can be used for the aircraft?**

- Timber and plywood
- Aluminium
- Composite materials / Glass Fibre Reinforced Plastics (fiberglass)
- Steel Tube and fabric.
- Other..... (your choice!)

### **Where to get these materials?**

- Recognised suppliers of aircraft grade materials
- Specialist suppliers
- Other sources, local and overseas

### **What instructional books are available?**

- EAA Aircraft Building Techniques -WOOD – EAA (USA)
- Sportplane Construction Techniques – Tony Bingelis
- The Sportplane Builder – Tony Bingelis
- Firewall Forward – Tony Bingelis
- Tony Bingelis on Engines – Tony Bingelis
- FAA Advisory Circular 43.13–1b.
- Kitplanes magazine
- Custom Planes Magazine
- Pacific Flyer Magazine

### **Workshop requirements:**

Anything from a small space with a workbench would get you started, all the way up to a single or double car garage, and on to a dedicated workshop. Most builders set up in their garages. The main points would be that the area is suitable to build the aircraft; good lighting and ventilation, adequate benches, tool space, space for completed component storage, space for material storage. You certainly don't want to have to fight your way into your workshop to do anything!

### **What tools are required?**

- If woodworking: Basic home workshop tools and hand tools, many of which you may already have.
- If metalworking: Specialized rivetters and hand tools, welding gear, most of which you may not have.
- If working in Composite construction: various hand tools, protective clothing

### **Building from a kit:**

Most kits these days have comprehensive instruction manuals, drawings, photographs and diagrams. Many have pre-formed components ranging from pre-cut, pre-bent, pre-drilled to pre-assembled sub-assemblies where difficult items are done for you.

### **Working from plans only:**

Many plans **do not** have specific detailed step-by-step instructions. Many people who build from plans do so with many years experience with model aircraft to call upon. While generally not difficult, they do require a certain talent for being able to work things out yourself.

Whether or not full size patterns are given on your plans;

- Read any instructions thoroughly
- Study the plans carefully
- Measure **twice**,
- Cut **once!**

Try to work as accurately as you can, but in reality, tolerances of around 1/32<sup>nd</sup> to 1/16<sup>th</sup> of an inch are perfectly acceptable.

### **Buying a partially completed project:**

Sometimes, a partially completed project becomes available, usually when a builder loses interest or no longer has the time to devote to it. You may purchase one of these and complete it and it still qualifies as an amateur-built project. Be advised though, that if considering this path, you **must** also obtain all construction logs and records of the project as you will need these to substantiate that the project was indeed **amateur built**.

### **The process**

A builder obtains plans and materials or a kit. We strongly suggest that you then make contact with and visit as many other builders in your area as possible, in order to start your learning curve. Be advised though, it's really steep, but also a fantastic experience!

### **Builders logbook and records**

You **must** keep construction logbooks, records and photos, primarily to prove that **you** built the aircraft. There is no set format at this time, it is far more important that they exist in some form, rather than what form that is. See the SAAA Information Paper "**Construction Records and Stage Inspections.**"

### **Modifications:**

You are free to introduce modifications (*experiment*) as you build.

### **Engines**

**Any** engine may be used, either a commercial aircraft engine, a converted automotive engine, a converted **anything** engine, or even a home-made engine. Yes, even a jet engine.

### **Propellers**

**Any** propeller may be used, commercial or even home-made.

### **Inspections:**

**You are solely responsible** for the construction and integrity of the design, however SAAA volunteer Technical Counsellors may conduct inspections upon request, to offer advice, instruction and encouragement. Components **are not** required to be "signed off" when completed. See the SAAA Information Paper "**Construction Records and Stage Inspections.**"

### **Final Inspection:**

For G.A. aircraft, this is conducted by an “Authorised Person”, often an SAAA member who has been appointed by CASA to perform this task and issue your Special Certificate of Airworthiness – Experimental.

### **Flight Test:**

Generally speaking, if suitably experienced, you may test fly your aircraft yourself, or you may have another experienced pilot do it for you.

### **Maintenance:**

If you are *the builder* of the aircraft, you may do all the maintenance on it, or you can have it done by a licenced aircraft maintenance engineer.

If you *buy* a completed and flying homebuilt aircraft, you *cannot* do the maintenance on it yourself.

### **“Cheque book” building:**

This term refers to a person who would prefer to write cheques over wielding a spanner or other tools to get an amateur-built aircraft constructed. Unfortunately, this practice does go on, usually behind closed doors.

While the quality of the product produced is normally excellent, you will face serious difficulties getting the aircraft inspected for CofA issue if you cannot *prove* that *you* built more than 51% of it. This 51% is called the *Major Portion Rule*, detailed in various CASA Advisory Circulars applicable to Experimental Aircraft. Often, the actual assembler of such an aircraft gets paid regardless of the outcome – it’s not *their* problem if you can’t get the plane certified to fly. Please don’t attempt to have someone else build a whole plane for you – you may be *seriously* disappointed in the end.

This *doesn’t mean* however, that you have to build 100% of the aircraft yourself! It is normal for additional specialised or professional help to be sourced and utilized during the construction phase. A perfect example would be someone building off plans, making metal components and sending them out to a professional welder, or having parts machined up on a lathe by a fitter and turner. Also, many aircraft designs often have some components available “off the shelf” – fuel tanks, landing gear, canopies and cowls to name a few.

## Help?

### Chapters:

SAAA members have formed Chapters in various areas to foster interest in the home-built aircraft movement. The members are a valuable source of information and fellowship. Chapter details can be found on the SAAA website.

### Email:

There are groups of like-type aircraft builders set-up around the world that you can join via the internet who can share your passion and provide assistance, advice and encouragement.

### The SAAA Builder's Assistance Program (B.A.P.)

The program is an agreement between builder and SAAA, and it is a semi-formal way to recognise that the builder is seeking advice and input, is following sound construction methods and practices, and is therefore committed to ensuring a safe product at the end. Technical Counsellors conduct "visits" to builders workshops when requested, look over what they have done, discuss construction and practices etc, and are free to make any suggestions you feel noteworthy. The B.A.P. suggests that these "visits" should be initiated by the builder as works progress. Alternatively, the builder might visit the T.C. and take some components to show, or go to learn how to do a particular job. The builder is under *no* obligation to follow the T.C.'s advice, nor can the T.C. *insist* that changes be made. The builder should keep records of visits by T.C.'s and other experienced builders looking in, and note any items discussed.

**Highly recommend books:**

**THE SPORTPLANE BUILDER** – Tony Bingelis

335 pages; Introduction to homebuilts, Your workshop, Construction practices, Control systems, Fiberglass tips, Cockpits & cabins, Canopies & windshields, Electrical systems, Instrumentation, Landing gear, Covering & painting, After the aircraft is finished.

**SPORTPLANE CONSTRUCTION TECHNIQUES** – Tony Bingelis

368 pages; Getting ready to build, Construction tips & practices, Fiberglass components, Control systems, Cockpit & cabin interiors, Canopy & windshield, Landing gear, instrumentation, Electrical, Painting & finishing

**FIREWALL FORWARD** – Tony Bingelis

301 pages; Engine selection, Handling & storage, Firewall preparation, Engine mounts, Exhausts & mufflers, Cowls & cooling, Lines & hoses, Fuel systems, Ignition & electrical, Powerplant instruments, Engine installation, Propellers & spinners, Centre of gravity, Engine operations

**TONY BINGELIS ON ENGINES** – Tony Bingelis

239 pages; Engine selection, Engine installation, Firewall preparation, Engine baffles, Engine cooling, Engine compartment, Ignition & electrical, Fuel systems, Exhaust systems, Propellers & spinners

*\*\*These four books are considered to be the best available on homebuilt aircraft construction. They are available from Skylines Aviation Supply at Moorabbin or Coolangatta Airports, either individually, or as the set at a slightly better price. All are very worthwhile having in your workshop.*

**EAA AIRCRAFT BUILDING TECHNIQUES – WOOD** – EAA USA

135 pages; Glues & gluing, Jigs & fixtures, Using non certified wood, Splicing, Construction methods, Laminating and bending, Wood testing and lots more hints from the EAA Magazine.

**The following Regulations, Advisory Circulars and publications govern the issuing of Experimental Certificates:**

CASA ADVISORY CIRCULARS

AC 21.3(0)	Special Certificates of Airworthiness – Overview
AC 21.4(2)	Amateur-Built Experimental – Certification
AC 21.10(0)	Experimental Certificates
AC 21.29(0)	Commercial Assistance during Construction of Amateur-Built Experimental Aircraft
AC 45.1(0)	Nationality and Registration Marks

CASR PART 21 Subpart H: Certificates of Airworthiness, in particular:

CASR 21.175	Special Certificates of Airworthiness
CASR 21.191	Experimental Certificates
CASR 21.192	Eligibility
CASR 21.193	Experimental Certificates – General
CASR 21.195A	Issue of Experimental Certificates
CASR 21.195B	Duration of Experimental Certificates

CASR Part 45 Display of Nationality & Registration Marks and Aircraft Registration Identification Plates

CAR 1988 262AP Experimental Aircraft Operating Limitations

CASA Aircraft Flight Manuals Guide, May 2002

CASA Miscellaneous Legislative Instrument 352/06