



## Inspect your own Experimental-category LSA.

One of the well-known benefits of building your own aircraft and licensing it in the Experimental/Amateur-Built category is that the builder qualifies for an FAA *repairman certificate* for that particular homebuilt and can therefore perform its annual condition inspection instead of paying an A&P mechanic to do it.

Now, under the new Light Sport Aircraft (LSA) rules, repairman certificates that authorize annual condition inspections are available for two categories of LSAs. The simplest version, called the *inspection certificate*, is for owners of the so-called Experimental Light Sports (ELSAs). People wanting this rating attend an approved 16-hour course and pass a written test, and their local FAA office provides the repairman certificate for the specific ELSA owned by the course graduate.

The other certificate, called *maintenance repairman*, comes at the end of a 120-hour program for people who will charge to maintain and inspect both ELSAs and factory-built LSAs.



Carol and Brian Carpenter begin a 16-hour ELSA repairman course in EAA Chapter 292's hangar in Independence, Oregon.

Carol is a California credentialed teacher who wrote the syllabus for Rainbow's repairman courses and got FAA approval for them. She is also a new LSA flight instructor, which means transitioning ultralight pilots who seek the Sport Pilot license and transition from their two-seat ultralight trainers or "fat" (illegally heavy)

### Becoming a Repairman

I sat in on the 16-hour inspection repairman course taught by Brian and Carol Carpenter of Corning, California. Their business, Rainbow Aviation, specializes in every type of training relating to ultralights and now LSAs. Brian has 30 years of aviation experience. In addition to his ultralight instructor credentials and experience, he is a certified airplane and instrument instructor (CFII), A&P IA mechanic, FAA-designated pilot examiner and designated airworthiness representative (DAR) who can license homebuilt aircraft.

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*Dave Martin, who served as editor of this magazine for 17 years, began aviation journalism evaluating ultralights in the early '80s. A former CFI (airplanes, gliders, instruments), he's flown more than 160 aircraft types plus 60 ultralights (including a single-seat, no-basket hot air balloon). Now living at a residential airpark in Oregon, he flies his Spacewalker II homebuilt as a Sport Pilot.*

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single-seat ultralights have access to one-stop shopping.

Brian can help get the aircraft registered as an ELSA (until the January 31, 2008 deadline), Carol can provide flight and ground instruction to Sport Pilot standards, and Brian can administer the checkride. Experimental aircraft may be maintained by anybody, so the 16-hour repairman course can become icing on the cake for some truly inexpensive sport flying. Since 2005, the Carpenters have driven thousands of miles to present their inspection and maintenance courses.

### But What's an ELSA?

Unfortunately for the sake of logic and clarity, an Amateur-built Experimental is *not* an ELSA. The primary definition of an ELSA is that it is the kit version of a factory-built SLSA. Unlike an Experimental/Amateur-Built (where the primary builder must do more than half of the work), an ELSA "kit" may be as complete as the manufacturer wants it to be. But the design, engineering, testing, documentation, parts tracking and follow-on support are identical to the company's similar SLSA.

Being partly customer-built (even if the only task might be applying cockpit placards), an ELSA could sell for less than its SLSA look-alike if the factory perceives reduced liability. A disadvantage for the ELSA customer is that unlike the factory-built SLSAs, an ELSA may not be used commercially, such as for paid flight instruction or rentals.

In addition to this type of ELSA, there are the former two-seat and heavy ultralight ELSAs. Incidentally, the converted two-seat trainer ELSAs may continue to be used for paid flight instruction until 2010. After that date, these aircraft may not be used commercially but may be sold for private use. The theory is that ultralight instructors



Slides and a model illustrate the importance of balanced controls to avoid flutter.

will have had six years' notice since the rules became effective to buy an SLSA for continued commercial use.

### Back to Class

Whew! Now that the hard part is over, let's get back to something more enjoyable: reviewing the Rainbow Aviation 16-hour repairman course. The FAA limits class size to 16 students. (My attendance didn't count; I didn't take the test or get the certificate.) Three quarters of the course is classroom instruction, and 25% is hands-on learning, as required by the FAA. Course content emphasizes regulations, aircraft systems, theory of flight and inspection checklists. A course evaluation is followed by a written test requiring 80% to graduate. Everyone passed in the session I monitored.

Noting that this is not a Rotax repair course, Brian spent several hours on the proper feeding and maintenance of both two-stroke and four-stroke engines. He says the two-strokes' reputation for poor reliability is because people don't understand the need to load the engine output properly. Both overloading (lugging the engine with too much propeller pitch or diameter) or underloading (prop pitch too fine or diameter too small) can cause seizures. Experimenting with carburetor jets and exhaust systems often leads to problems. Using Brian's recommendations, two-stroke pilots in his area have completely eliminated



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# LIGHT STUFF



Brian Carpenter shows how to inspect for contamination in a used oil filter element, an excellent way to gauge an engine's health.

high-octane fuels contain less energy than low-octane gasoline surprised some. Octane additives slow the burning process, which is necessary to avoid destructive detonation.

Hands-on topics of particular interest included cutting a used oil filter and then using the filter element to identify contaminants: aluminum and steel (a bad sign after initial break-in), lead, carbon, silicon and others. Oil filter inspection is now required for all annual condition inspections. Identifying aircraft-grade hardware was another exercise in class. We learned about AN, NAS and MS nuts and bolts, cotter pins and safety wiring. The final drill was to inspect two ultralight aircraft in an adjoining hangar. We all found problems that needed correcting to pass an annual inspection.

### Was It Worth It?

In this case, "worth it" meant spending two full days and \$375 to attend the class. From my count, only two of the 16 graduates currently have ELSAs on which they can use their new knowledge and perform the next annual condition inspection. Yet without exception, all 16 pilots were glad they spent the time and money, and they judged the Carpenters' course to be outstanding.

After conducting a second two-day course, the Carpenters administered the Sport Pilot flight test to a member of our class. She has flown her single-seat Maxair Drifter ultralight for years, but has converted it to ELSA status and is now a licensed pilot whose future logged time counts toward higher FAA licenses. †

*For more information on the Carpenters' training and other services, visit [www.kitplanes.com](http://www.kitplanes.com) for a direct link to their web site.*

engine failures, he said.

Carol shared guidance on what qualifications are required to perform specific operations (preventive maintenance, annual inspection, 100-hour inspection for aircraft used commercially, ELT inspection and maintenance, and major and minor repairs) for various aircraft types: Standard and Primary category, Experimental/Amateur-Built, SLSA and ELSA. A sample fact: Anyone can maintain any Experimental aircraft. Her example was that a talented monkey with tools may maintain and make major repairs on Experimentals—and charge for it—and the owner of any aircraft may inspect and service the ELT. She emphasized the required logbook entries during maintenance and for the annual condition inspection. Students practiced writing log entries based on hypothetical situations.

Brian provided one of the best brief discussions on the theory of flight that I've heard. He clearly illustrated using coefficient of lift and coefficient of drag formulas, and he emphasized the importance of understanding angle of attack. In another classroom session, he noted the importance of rib stitching on fabric-covered aircraft. Some DARs will not license aircraft without wingrib stitching, he said.

Exhaust systems, especially on two-stroke engines, were emphasized. The color of the exhaust residue is important. As with spark plugs, tan is a good sign. Rust and cracks are common. Exhaust springs often fail, and lubrication of system ball joints is important.

Fuel systems and fuel types also came in for special attention. The fact that