



If the rules of aviation were rewritten to say that a pilot could buy one, and only one, airplane to fill every need he could foresee in his flying life, the chances are very good that the Cessna 182 would be that one airplane. Look at the things this airplane does well—it is comfortable and stable, it is a true four-place airplane, it is a rock-solid instrument platform, its takeoff and landing capabilities are almost STOL-like, and it is dependable because of its simple systems. ■ The pilot who had chosen the 182 as his one and only airplane

actually could have many airplanes. This is because of the amazing number of FAA-approved modifications—supplemental type certificates (STCs) that have been developed for owners and operators by maintenance facilities and modification shops. The capabilities of the airplane made it a natural for modifying—it has a strong engine, an airframe that is not

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in the FAA registry
for Cessna's 182**

BY STEVEN W. ELLS

PHOTOGRAPHY BY MIKE FIZER

only large but can carry reasonable weight, and it's safe and easy to fly.

One reason for the wide spectrum of modifications is that Cessna built a lot of 182s. More 182s have been pushed out the doors at the Cessna factory in Wichita than any other general aviation airplane except two—the Cessna 172 and the Cessna 150.

Cessna introduced the 182 in 1956 and built it continuously until 1986 for a production run of 19,613 airplanes. Another 752 have been manufactured since Cessna resumed production in 1998. A recent inventory shows that 12,874 182s are currently registered in the United States.

There are 577 STCs for the 182 currently in the FAA's registry. The array of modifications is staggering in its scope. Most 182 owners are familiar with the more common modifications such as speed mods, STOL kits, and engine horsepower upgrades, but how many know of an STC to install floats, or of one to install a large observer window in the left side of the fuselage?

For a look at all the current STCs, visit the FAA's Web site (<http://av-info.faa.gov/stc/>). When the query menu comes up, type "3A13" in the type certificate (TC) window. This will bring up every STC that's ever been approved for the 182. A word of warning, though, before you get too excited about some of the more exotic and lesser-known STCs that you will find on this Web site. Some of these STCs are dormant—especially the older ones. In other words, the holder of the STC isn't active—so information related to the STC may be unavailable from the holder. The FAA Web page offers some options that may help those who seek information on dormant STCs.

Shoulder harnesses

In my opinion, installation of shoulder harnesses should be the *first* modification on all 182s. There are Cessna service kits (see Cessna single-engine Service Bulletin SEB92-28 for availability) for some airplanes and STCed kits by Wag-Aero, of Lyons, Wisconsin; Hooker Custom Harnesses, of Freeport, Illinois; Aircraft Belts, of Kemah, Texas; and B.A.S. Inc., of Eatonville, Washington. In the case of shoulder harnesses, an ounce of prevention is worth a long ton of cure. Studies by the AOPA Air Safety Foundation have determined again and again that many fatal aircraft accidents could have been survived if the airplanes were equipped with shoulder harnesses.



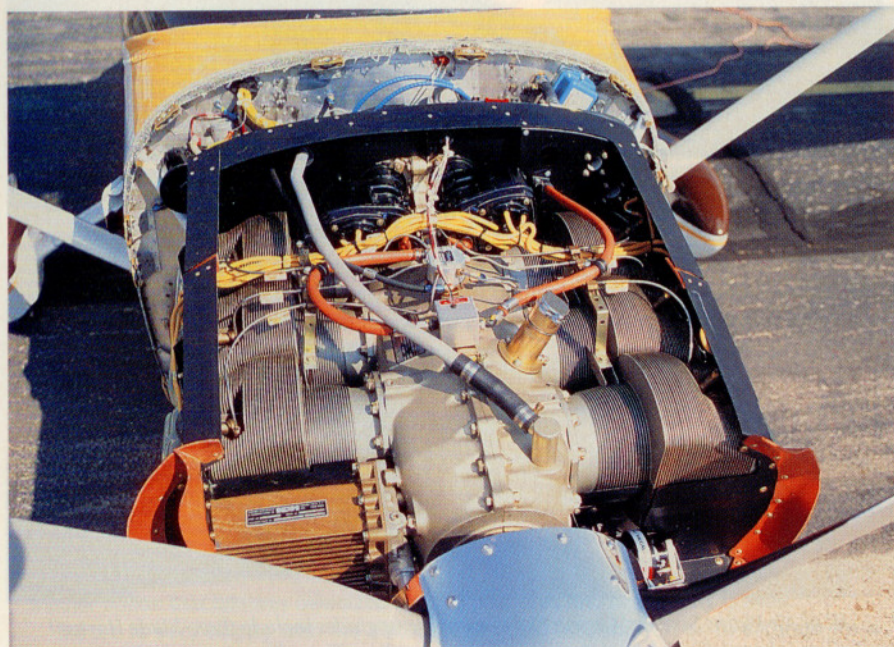
Shoulder harnesses, such as these B.A.S. Inc. harnesses with inertia reels (above) installed in a Cessna 172, are an excellent starting point for modifying a Cessna 182. Also popular are engine upgrades; Air Plains Services, of Wellington, Kansas, offers 300-horsepower conversions for 182s that utilize one of two Continental powerplants (top and preceding pages).

High-priority modifications

Based on my six years of experience as a tech rep for the Cessna Pilots Association, there are three things Cessna 182 owners are most interested in. The first is a higher maximum gross weight, especially for the 1956 through 1961 models, which had maximum gross weights of 2,550 lb. or 2,650 lb. Air Research Technology Inc. sells its Wing-X Antigravity STOL Conversion for all 182 models. This STCed modification consists of installing wing extensions, thus extending the wingspan 37 inches and increasing the maximum gross weight up to 2,950 pounds. This

normal cruise altitudes and power settings. Decreasing airframe drag is the way to increased speed. Three companies sell drag-reduction kits. Charlie Siebel, a retired Cessna engineer, developed the Flight Bonus kit that is now sold by Horton STOLcraft in Wellington, Kansas. Siebel, now deceased, advertised that his kit would increase the cruise speed of 1962 through 1982 airplanes from 12 to 18 knots, depending on the year model.

During a calm morning last spring, Dick Bicknell and I flew his Flight Bonus-equipped 1980 Cessna 182Q to determine the airplane's maximum speed. As I



This Continental IO-550, installed in Gene Houghton's Cessna 182 by Air Plains Services, produces 300 hp to pull the venerable airframe. The Kansas firm offers customers a variety of options—IO-550 or IO-520, new or factory remanufactured.

mod also increases performance, because the additional wing area increases lift.

While there are modifications that increase the max gross weights for certain Cessna 180s, this is the only maximum gross weight increase that is available on the 182 series. The gross takeoff weight of the 182 continued to increase as Cessna made model changes. In 1970 Cessna increased the maximum gross weight of the 182 to 2,950 pounds, although the landing weight remained at 2,800 pounds until 1972, when the landing weight was also increased to 2,950 pounds with the change to a tubular-style main landing gear. The maximum weight remained at 2,950 pounds until 1981, when it was increased to 3,100 pounds.

The second most desired modification is more speed. Honest 182 owners will tell you they flight plan for 130 to 135 knots at

monitored the prop rpm with a tach checker, Bicknell flew a full-throttle, maximum-rpm speed run at 1,500 feet msl over Winter Haven, Florida. IAS was 142 kt, resulting in 152 KTAS or 175 mph.

Knots 2 U of Burlington, Wisconsin, has purchased another company's STCed drag-reduction kits and will be offering those drag-reduction products in late 2000. Maple Leaf Aviation Ltd, in Brandon, Manitoba, Canada, also sells some speed-fairing kits. Drag-reduction kits enable Cessna 182 owners to get the benefits of a faster airplane without purchasing a new airplane—or incurring retractable-gear insurance premiums.

The third most desired information is related to reducing the direct operating costs. Obtaining a partner in the airplane is one way. Short of that, the only way is to reduce the cost of fuel. Both the Experimental Aircraft Association and Petersen Aviation in Minden, Nebraska, sell auto

fuel STCs for \$1 per horsepower. For \$230 you get to legally burn auto gas in your 1956 through 1976 182. Aircraft built in 1977 and later require 100-octane avgas because of an increase in compression ratio and aren't eligible for auto fuel STCs. Using current fuel prices of \$1.64 for unleaded auto fuel and \$2.50 for avgas, and assuming a 13-gallon-per-hour fuel burn, the cost of the STC would be recaptured in fewer than 20 hours of flight time. AOPA members considering this should realize that there are some struggles with going the auto fuel route, including the need for using leaded avgas during certain operations; the hassle, liability, and danger of transporting, handling, and loading auto fuel; the restrictions some airports impose on auto fuel users; and the limitations of the fuel. In addition, some engine rebuilders don't support the use of auto fuel in aircraft engines. For more information related to auto fuel usage, contact the EAA Flight Center, telephone 920/426-4843, or visit the Web site (www.eaa.org); Contact Petersen Aviation, telephone 308/832-2050.

More horsepower

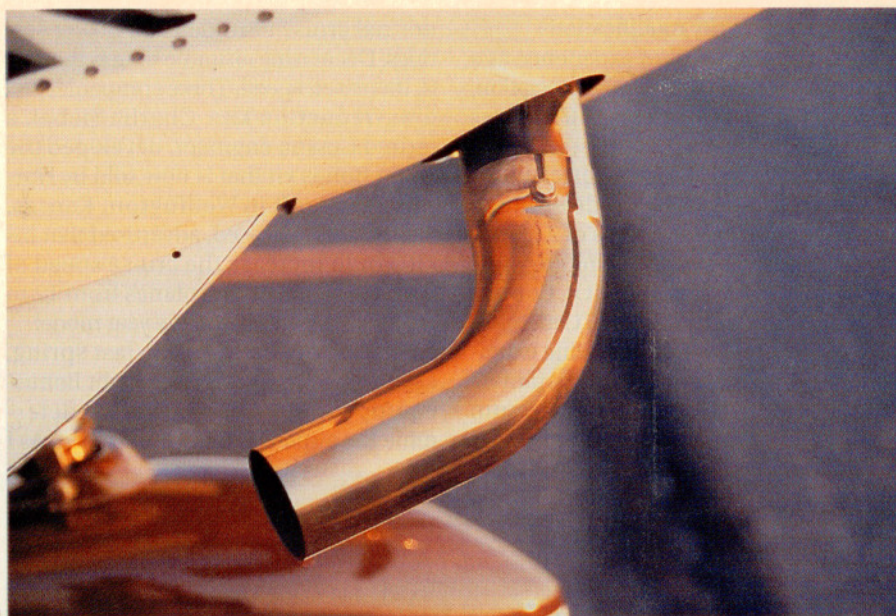
While the 230-hp O-470-series engines are regarded as dependable, there are a number of options to consider when it's time to re-engine a 182. Texas Skyways in Boerne, Texas; Air Plains Services of Wellington, Kansas; and John Jewell Aircraft Inc., of Holly Springs, Mississippi, all have STCs to install 300-hp IO-520 and -550 engines. Peterson's Performance Plus, of El Dorado, Kansas, has an STC to install the ultradependable 260-hp fuel-injected IO-470 engine (see "Peterson's 260SE is a Different Breed of 182," p. 79). Owners who prefer carburetion over fuel-injection can gain horsepower increases through STCed engine replacements from Texas Skyways; Norland Aircraft Services, of Norland, Ontario, Canada; and P. Ponk Aviation of Camano Island, Washington.

More horsepower will increase your airplane's climb performance, but claims for quantum increases in cruise speeds should be viewed with a grain of salt. The laws of physics related to aircraft speed increases are ruled by the cube law, which says that doubling the horsepower of an engine will increase the speed by the cube root of two, or 1.26 (26 percent). By this law, removing the 230-hp engine and installing a 300-hp engine (a 24-percent power increase) could increase the maximum speed by 9 percent. Fuel-injected engine installations will prevent carburetor icing, which is one of the

182's Achilles' heels. Consolidated Fuel Systems, a division of Kelly Aerospace, in Montgomery, Alabama, has bought the old Rajay turbocharger installations that, according to the original STC, can be installed on any of the carbureted O-470-series-engines in 182s.

Fuel system modifications

All models of the 182 manufactured prior to 1979 had bladder-type fuel cells



All of Air Plains Services' Cessna Skylane engine upgrades include three-blade Hartzell propellers (above left). Exhaust stack extensions (top) from Texas Skyways and wingtip recognition lights (above) from RMD Aircraft Lighting are among many other available mods. A Horton STOL kit, shown for a Cessna 172 (bottom, facing page), includes distinctive drooped wing tips.

installed in the wings. Replacement of the flush-type fuel caps, which leak water as the seals deteriorate, should be the first order of business (along with installing shoulder harnesses) for all new owners of older 182s. Both Monarch Air and Development, of Oakland, Oregon, and Cessna offer umbrella-style fuel caps. The motive for removing the leak-prone flush caps is obvious; because of wrinkles in the bottom surface of some of the older bladders, water that gets past the caps will be blocked from flowing to the quick drains. Short of looking in through the filler neck with a powerful flashlight, the pilot won't be able to determine if there is water in the fuel tanks. During takeoff acceleration or liftoff, any water present may jump the tank wrinkle and enter the engine in a big slug when the airplane is low and slow. This predictable scenario has resulted in a number of fatal accidents. The "do it one time and you will never again have a problem" solution is the installation of umbrella-type fuel caps.

Monarch also sells rigid tanks that replace the fuel bladders. These tanks are permanent and will never have a

wrinkle that hides water.

If you need more fuel capacity, then Monarch; Flint Aero, of El Cajon, California; and O&N Aircraft, of Factoryville, Pennsylvania, sell kits that can increase the fuel system capacity.

Since the fuel gauges in Cessnas can be inaccurate, installation of a fuel flow/totalizer instrument will ensure that you have an accurate fuel accounting. Electronics International, in Bend, Oregon; JP Instruments, in Huntington Beach, California; and the Shadin Company Inc., in Minneapolis, Minnesota, all have STCed devices that will help you track your fuel usage.

Floats

If you've never experienced the fun of floatplane flying, you have something to look forward to. In the past, 182 owners could only wistfully watch as their neighbors went down to the lake for

their flying. Today, there's a solution. Seaplanes West, of Sherwood Park, Alberta, Canada, has an STC to install Aerocet 3500L floats on 1962 through 1986 models. Whitey Hostetler at Red Lake Seaplane Service in Red Lake, Ontario, Canada, has STCs to install Edo floats on 1956 through 1971 182s, and Wipaire, in Inver Grove Heights, Minnesota, has a float STC for late-model Cessna 182s.

STOL kits

The 182 without modifications is a pretty good STOL airplane. But it can be made better by the installation of permanently installed drooped wing leading edges and stall fences. Both Horton STOL Craft, in Wellington, Kansas, and Flite Research, of California City, California, have STCed kits that will improve the slow-flight characteristics and allow slower approaches. Both of

Peterson's 260SE is a different breed of 182

Expanding the 182's flight envelope by 10 to 15 knots—on both ends

Kevin Moore, AOPA 968424, shopped around for a new airplane before he finally bought a highly modified Cessna 182. Instead of opting to purchase a good 182 airframe and adding mods one by one until the airplane had the speed kit, STOL kit, and engine he wanted, Moore bought a 260SE/STOL aircraft from Todd Peterson's Performance Plus Inc., in El Dorado, Kansas. And is he smiling.

"With a stall speed of 35 knots and a cruise of 150 to 153 knots, the 182's flight envelope has been expanded by 10 to 15 knots on both the top and low ends," says Moore.

Moore traveled to El Dorado Airport to pick up his "new" airplane. "The plane was delivered in like-new condition, with a new interior, leather seats, a new panel with internally lit instruments with my choice of avionics, and new paint. The quality inside and out was excellent."

In addition to everything Moore spoke so enthusiastically about, each 260SE has a new TCM Gold Medallion IO-470 engine, an aerodynamic cleanup, and a high-lift canard wing system. The canard contributes to a flat deck angle during climb and enables the airplane to maintain the same flat deck angle during slow flight at 55 knots.

Airplane shoppers interested in buying one of Peterson's creations will have to get in line for delivery, since the demand for airplanes that Peterson has bought, inspected, refurbished, and modified to full 260SE/STOL status is growing. Peterson and his wife, Jo, comprise the complete work force, thus ensuring high standards. Peterson says he's having a lot of fun because he believes in his product and is confident that the 260SE is a very safe airplane.

The Petersons can supply kits for field installations of all the options except for the canard, which must be done at the Performance Plus hangar in Kansas. There is a Bushmaster option that features oversized landing gear tires and heavy-duty brakes.

Moore is very happy with his choice. For more information or to arrange for a demonstration ride, contact Peterson's Performance Plus Inc., 1465 Southeast 30th, Municipal Airport, El Dorado, Kansas 67042; telephone 316/320-1080; fax 316/321-3842; or visit the Web site (www.260se.com). —SWE



these kits are effective, relatively easy to install, and inexpensive.

Vortex generators by Micro Aerodynamics Inc., of Anacortes, Washington, have been recently STC'd for the 182. These small devices also improve the 182's slow-speed handling, which is truck-like.

Sierra Industries, of Uvalde, Texas, sells the STC for what is known as the "Robertson STOL" installation. This kit consists of a drooped wing leading edge, stall fences, and changes to the aileron control system that cause the ailerons to droop as the flaps extend, to further add lift at low speeds. This system is more expensive than the other kits but has the potential to do more. Any of these devices that aid control of the airplane at low airspeeds

also contributes to survivability in the event of an off-airport landing.

Backup vacuum and electrical systems

Adding redundancy is another way to increase safety and reliability. Backup vacuum systems are available. Precise



Flight of Bend, Oregon, has a low-cost STC'd system that allows the pilot to open a valve, thus connecting the airplane's instrument vacuum system to the low-pressure air in the engine intake manifold should the primary vacuum pump fail. STC'd electric motor-driven systems by Airborne, of Elyria, Ohio, and Aero Safe, of Granbury, Texas, are installed on many IFR airplanes. While not yet STC'd for the 182, B&C Specialty Products, of Newton, Kansas, sells a 20-amp backup alternator system that mounts on an engine accessory pad.

These backup systems ease the "what if" concerns if time is spent flying actual IFR. Many owners, when realistic about their capabilities, decide that the cost of a simple switch-actuated backup vacuum system is easier to handle than a transition to "needle, ball, and airspeed" should a vacuum pump fail in actual instrument conditions.

Additional 182 help

The Cessna Pilots Association in Santa Maria, California (800/343-6416 or www.cessna.org), is recognized for its expertise on behalf of its members. Many members report that the detailed technical help is well worth the cost of membership. If you're a reader and want to learn some helpful 182 tricks, order a copy of Richard Coffey's book titled *A Skylane Pilot's Companion* (320/245-2111). No matter when or where you read it, it'll put you in a Skylane frame of mind.

The AOPA Air Safety Foundation's study of the Cessna 182 has been compiled into a book titled *Safety Review—Cessna 182 Series*. This book is available through Sporty's Pilot Shop at 800/LIFTOFF. Information in this study will help 182 pilots better understand their airplanes.

The Cessna 182 is a very capable, safe airplane that has a couple of weak points. These weak points can be eliminated by installation of STC'd modifications, resulting in a safer airplane. STCs also allow owners to expand the operating envelope, add capabilities, and modernize their beloved 182s. □

i Links to additional information about Cessna 182 modifications, including contact information for companies mentioned in this article, may be found on AOPA Online (www.aopa.org/pilot/links.shtml). E-mail the author at steve.ells@aopa.org