

Engine and Propeller UPGRADES

Want–Need–Must Which applies to you?

By Donna Jones

Planning Stages

When considering engine and propeller options for your aircraft, the planning stages may begin years before the installation or overhaul ever takes place. Procrastinators—do not wait until the last minute to make a decision. The availability of necessary components may put a damper on your upcoming plans, putting you in AOG (aircraft on the ground) status when it's time to make a decision.

When I first started in aviation 17 years ago, potential customers would inquire about available options for their plane. Within a few days or weeks of their initial

inquiry, they were ready to make a decision. Not anymore. Aircraft owners plan for months and sometimes years to define and research their options and ideas before making a decision. This gives ample time to have finances in place before making a purchase.

There are many more options for operators now than in the early 1990s. The current economy and aircraft operation and maintenance costs are just some of the factors you must maneuver around to make a justified decision about your aircraft. This is where "Want–Need–Must" become factors.

New "Life" for Your Aircraft

Cessna stopped manufacturing new piston-engine aircraft in the 1980s. Over time, the aging Cessna fleet needed new "life." Engine and propeller manufacturers designed new products or tested other products in different applications. These developments allowed higher horsepower engines for installation as well as replacement propellers for the old-style designs. After putting together engine and propeller combinations with testing for vibration, noise, performance, etc., Supplemental Type Certificates (STCs) were established to install these options.



STC upgrade options for Cessna aircraft from the beginning models through Cessna 170 and 175 series are limited (if available at all). The Cessna 172, 180, 182, 185, 206, T206, 207, T207 and 210 series aircraft provide enough numbers that STC holders have pursued options for them. The twin Cessna aircraft have various options available as well. Davis Aviation Services offers engine and/or propeller upgrades for most of these, either by their own STCs or options developed by other STC holders. In cases where an STC is not available for a particular upgrade, a onetime field approval can be pursued if the necessary data is available for FAA approval.

When Cessna resumed aircraft manufacturing in the late 1990s, the public did not see higher horsepower engines being installed in the new aircraft. Instead, we saw different engine types installed with newer-design propellers. In essence, some of the older Cessnas with engine and/or propeller upgrades can outperform the new aircraft for a fraction of the cost of buying new. This makes an upgrade very appealing to the average aircraft owner.

Engine Options

A major expense in aircraft maintenance is the engine. There are often several options, including overhaul, standard replacement or upgrades. Factory engines come in new, remanufactured or overhauled forms. Do the necessary research before the purchase to ensure the best possible decision for your aircraft.

You can choose to overhaul and reinstall your existing engine. In certain applications, AD note compliance (such as VAR crankshaft updates) may be required at the engine overhaul. Therefore, it may be advantageous to replace the engine. Cost of parts and labor for overhaul may exceed the cost of an engine replacement. Obtain an accurate estimate of the cost involved, because the end result may not be what you calculated (especially if you have an old engine). Determine the worst possible scenario to make sure you don't get surprised when the bill shows up. With the investment, you don't want to regret a decision you will have to live with for the next several years.

Manufacturers prefer to see their old

PROPELLERS

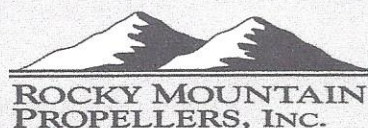
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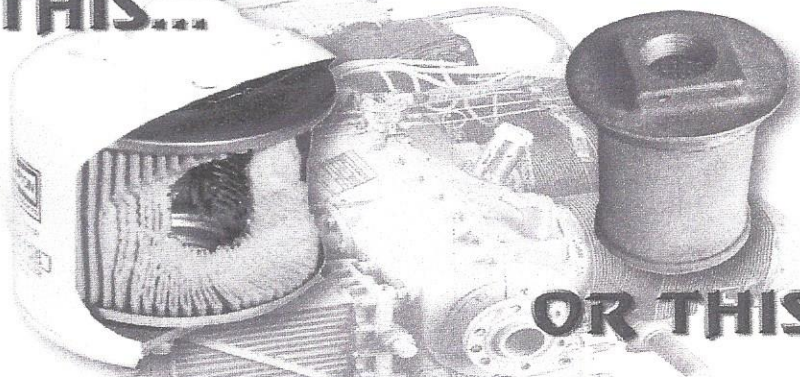


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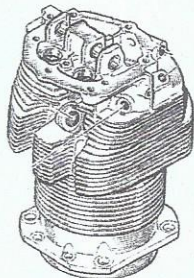
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engines out of the field, so they extend an exchange program for engine cores. This also allows manufacturers to have an overhaul program for individual parts and spares for the field as well as keeps parts available for factory-remanufactured engines. Any outdated parts the manufacturers do not want to reuse are scrapped or destroyed as they are removed.

Another option is to replace the engine with an overhauled or factory engine. Overhauled engines should be provided by FAA-approved shops to ensure that airworthy aviation parts have been used. The cost of the replacement overhauled engine may exceed the cost of other options due to the core return. The overhaul shop tears down the engine core for inspection, and if it determines there are not sufficient parts that can be overhauled and reused for another engine, extra charges may be added. Ask questions ahead of time to make sure you don't get an unexpected bill.

Engines that were manufactured as early as the mid-1990s seem to have a better track record for having acceptable core parts for the overhaulers to reuse. Even if you have a newer engine, you may have parts that are damaged from years of use and may not be acceptable. In these cases, you would be better off having your engine core returned to the overhaul shop, torn down and inspected prior to purchasing the replacement engine. This is not a time- or cost-effective procedure. Obtain an agreement from the overhaul shop that it will accept your engine core in "as is" condition as a running engine. Otherwise, you risk the chance of getting hit with extra charges in the end.

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gine from Teledyne can be purchased with your running engine core returned to the factory as exchange. Teledyne has not modified its costs for returning cores with non-VAR cranks, etc. It expects your engine core to be returned in "as removed" condition with all of the core parts included. Teledyne will also allow you to upgrade your engine and pay the core value difference. This must be approved by Teledyne when the engine is purchased.

Lycoming offers factory-new, remanufactured and overhauled engines. Be cautious that the Lycoming core is acceptable "as is" without deductions for older parts. Also, should you be making an engine upgrade, confirm the stipulations for returning same cores as well as unlike cores. In many cases, factory replacement is the most cost-effective option for both standard replacement and engine upgrades.

Upgrading your engine is another option. Different engine installation options may be available for your aircraft. There may be more than one company offering options for you. Most installations of engine upgrades have been put in the form of a Supplemental Type Certificate (STC). The STC holder works with the manufacturer to determine what type of upgrade to pursue. It works with the FAA to test, install and modify the aircraft to accommodate the upgrade long before you are ready for installation. It supplies the applicable parts to be installed under the STC along with a license to use the STC for the installation of a different engine for the aircraft. In many cases, not only is the performance of the aircraft improved, but modern components allow ease of replacement once you reach that point again.

Propeller Options

The propeller is another obvious expense and is normally required when replacing an engine. You have the choice of overhaul, standard replacement or upgrade. Overhauling a propeller will present the least expense unless blades or hub replacement is required. On the other hand, replacing the propeller may cost less if the existing propeller has been overhauled more than once.

Standard replacement of the existing model is a second option if the props are still available. Most of the older Mc-

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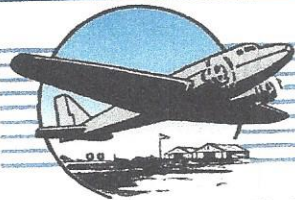


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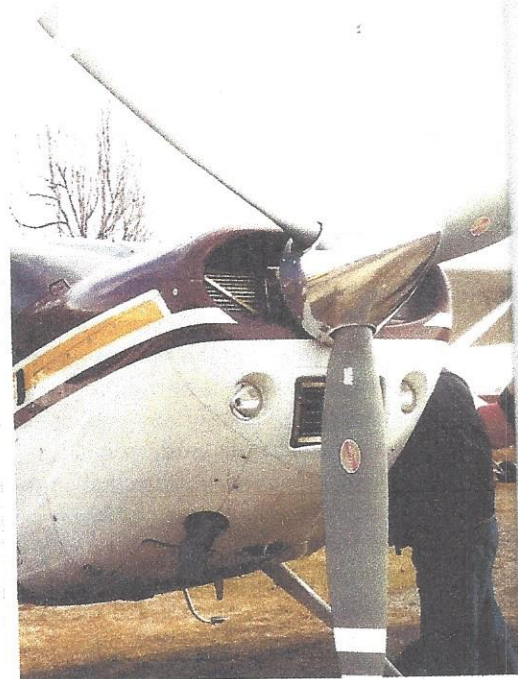
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Cauley propellers have become obsolete and are no longer being remanufactured. Not only were these propellers not tested with newer engine designs, they require replacement to another option as they *must* be replaced to keep the aircraft in airworthy condition.

This intervenes with the third option: propeller upgrade. As propeller-only upgrades are normally sold in package form (propeller, spinner assembly and STC paperwork), this option is very cost effective when compared to the purchase of a new standard propeller. In some cases, the propeller-only "kit" costs less than a replacement propeller. A propeller upgrade offers a newer-design propeller model that not only replaces an obsolete model but is also designed to improve the aircraft's overall performance.

Bigger may not necessarily be better when referring to propeller diameters. Larger diameter propellers perform well but require the aircraft power to be pulled back to accommodate noise limitations and promote maximum thrust levels. Cruise speeds are also affected by the propeller diameter. Your STC holder should offer help to determine the best option for your aircraft.

In many cases, the propeller-only upgrade is offered for use with the existing engine model. Additionally, the same



propeller can be used with an engine upgrade at a later time. This depends on the aircraft type and the STC holder options available for your aircraft. This option provides the opportunity to change the propeller first and the engine later without both expenses at one time (you basically do the modifications in installments).

Cost of Installation

In relation to Davis Aviation Services' Bonaire 550 upgrades or propeller-only upgrades, the cost to remove and replace your engine, propeller or both ends up with a minimal difference between the standard components and an upgrade. Installation expenses can vary depending on the additional modification requirements to accommodate an upgrade.

For example, the Bonaire 550 (IO-550 engine and propeller installation) on a 1980 Cessna A185F has the standard remove and replace expenses, and baffling must be trimmed, certain gauges removed and replaced and accessories reset to STC limits. In this case, the installation cost difference would be minimal as you would replace any worn baffling or silicone baffling at engine change time anyway. And you would want your gauges calibrated for accuracy. With an upgrade, you would remove and replace these gauges rather than remove them and send them in for calibration. Regardless of the type of engine you are installing, you will want to overhaul your accessories. Your accessories and other components transfer to the replacement engine, whether it is standard or an upgrade engine.

Cost Difference of Upgrade/Added Value to Your Aircraft

In the Cessna market for which Davis Aviation Services provides upgrades, the cost difference of engine and/or propeller upgrade compared to standard installation is minimal. However, this cost difference has been proven to add at least as much to the value of the aircraft, and often the value addition exceeds this difference. The performance differences also add value, making the aircraft more saleable. Plus, the added safety margin of the higher horsepower engine and new design propeller options help justify the

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added expense. I had a call from a Cessna 185 operator in Alaska one afternoon with the dreaded woe of his IO-520 making metal. He was told by another 550 operator to, "Just do it—you won't regret it," referring to the IO-550 installation. He was referring to not only the added performance but to the cost effectiveness of the IO-550 installation. This owner was researching his options in order to make a justified decision for his aircraft.

STC Holders

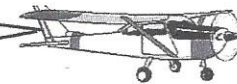
Work with reliable, reputable and established STC holders to ensure "service after the sale." Ask to contact other customers who have worked with the STC holder in the past to determine their background. These operators can provide you with firsthand knowledge of performance, value and other details to help you make an educated decision.

Want—Need—Must

By completing adequate research, you can determine where your engine and propeller choices (overhaul, replace or upgrade) fall into the following categories: "Want—Need—Must." Those definitions vary depending on your aircraft and how it is operated. It's up to the aircraft owner to make this final determination. You should be able to obtain accurate costs and justify your decision if you have done your homework ahead of time.

About the author and Davis Aviation Services: Donna Jones has worked in aviation for 17 years. She began with Bonaire Aviation Company and stayed with Davis Aviation Services when it bought the Bonaire 550 product line in 1998. She helped establish more than 30 STCs for the single-engine Cessna line and assisted with numerous field approvals and deviations when an STC was not available for a particular installation. Davis Aviation Services supplies worldwide distribution of the Bonaire 550 engine and propeller upgrades, propeller-only installations and engine-mount modifications. Davis Aviation Services offers a variety of STC options for Cessna 180, 182, 185, 188, 206, T206, 207 and T207 models and can be reached at (423) 652-1113 or via its website, www.davisaviationservices.net.^{CO}

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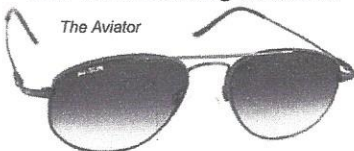


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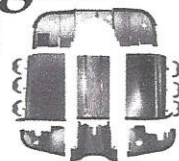
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