

Time to Overhaul (Jan 2006)

Patricia Jayne (Pat) Keefer - ICS #08899

Frankly we dreaded this whole overhaul thing so much that we'd hoped that one of our two AOPA memberships would get us the Win-a- Twin Twin Comanche. Since that strategy didn't work, it was time to overhaul the engines. Actually, it was past time. The touch of procrastination wasn't intentional; it was part work induced, part elder care induced and part fear induced. After all, it is the single most expensive elective maintenance. Each person will only have one first overhaul and there is a very high desire to do it correctly. So here is my/our experience.

The owner(s)

I consider this our airplane, and it is, as long as it is in flying condition. However, as wonderful husband of 30 years Ken says, "When it needs maintenance, it is all yours." Now to be fair here, I retired after a 30-year career with IBM and he is still working so I have greater control over my discretionary time. We both have project management experience and the dollar signs made this project a biggie. Ken did help with research and he was a wonderfully active listener as I put together and managed this very expensive set of action items.

The airplane

We are the second generation to own this famous functional family heirloom. As Twin Comanche PA39 serial #10, my parents took possession on their anniversary date in 1970. They had learned to fly at Tufts-Edgcombe, a Piper dealer and distributor, located in Elgin, Ill. They'd flown all the single engine Pipers of the day and decided the 'new' counter-rotated Twin Comanche would be the perfect business tool for their equestrian company-related travel. Dad died later that year and it was Mom who made the plane famous. For her many aviation accomplishments, Mom (Marion Jayne) was named as one of the 100 Aviation Heroes at the 2003 Centennial of Flight Kitty Hawk Celebration along with aviation luminaries such as the Wright brothers, John Glenn, Amelia Earhart and Eileen Collins (see www.firstflightcentennial.org). This plane has been in cross-country air races since 1970 and there was always discussion as to whether racing was hard on the engines. Experience is the judge here. What might have been harder on it was that both Ken and I got our multi-engine ratings in it and it is one sturdy bird.

The engines

The 160 hp IO-320-B1A left engine and the LIO-320-B1A counter-rotated right engine were installed new in 1992 and they enjoyed the good life as they raced at maximum power and 2700 rpm for over 80 hours around the world which helped Mom and sister Nancy Palozola win the silver medal. The engines had another good year in 1994, as Mom and I raced 105 hours at maximum power and 2700 rpm around the world and they helped us win the FAI Gold Medal. Race rules required factory stock model engines. The tough years for the engines were when Mom became ill and died of cancer in 1996. I was the primary caretaker with excellent husband support and the plane sat idle. Instead of frequent flights, the engines didn't move for weeks at a time. Then they were stationary for six weeks for a new interior and they sat still for much too often during the last five years as we learned to integrate elder care management for my father-in-law into our lives. Letting the engines sit is the most abusive thing for engines. The 2003 and 2004 annual expense reflected the lack of use. I had planned to do the engine overhauls in the fall of 2004, but elder care took precedence. The 2005 annual was looming and the engines had about 2000 hours in their 13 years.

The overhauls project(s)

There was something positive about the delay. We read a lot about overhauls and talked to a lot of people. More than just the engines would be overhauled. The engine basket mounts, alternators and prop governors (props were done the year prior) would also be done. I learned that even though I think of these things as being part of the engine, since Lycoming doesn't, neither do most overhaul shops. So these pieces and parts were handled separately. Is there any wonder my project management spreadsheet was four pages long? Normally starters and all fluid carrying hoses would be replaced at overhaul, but we'd

done that work at the 2003 annual so we kept them. We got new oil coolers because Zephyr helped me understand the new and overhaul price were very close.

Initially I'd planned to have the engines removed, overhauled and re-mounted with the annual inspection all done at the same location. I found the industry doesn't work that way, so the engines were removed and shipped to Florida. After all, once the engines are on the truck, who cares whether they go one mile or 1,000 miles.

Choosing Zephyr Engines to do the overhauls was the result of a LOT of research. I talked to six different shops. We choose Zephyr for four reasons: their Aviation Consumer Magazine rating as one of the top overhaul shops in the country, their reputation for customer service, their two-year warranty and their knowledge of our engines. It didn't hurt that they advertise in this magazine and Charlie Melot has a Twin Comanche. I relied heavily on Charlie's advice and counsel. I found him to be fabulously opinionated, extremely knowledgeable and endlessly patient with all the questions from a first-time overhauler. The man was, and is, extraordinarily responsive. At one point, I emailed Charlie at 7 p.m. EDT on a Friday night. I had a response within the hour and a fax with the needed documentation by 10:30 a.m. on Saturday morning. Charlie and his crew are true professionals.

Using classic project management techniques, I called each major contributor to the overhaul project once a week to check status and address any questions. With nothing to fly and pieces and parts scattered all over the country, I spent more time watching the Weather Channel and hoping the various severe weather conditions, including a hurricane pointed at Florida, would not damage the businesses that had my parts. One element of my pre-overhaul research was checking that my aircraft insurance would cover the engines while they were out of the plane and in transit. USSIC does; Zephyr also carries insurance.

When I briefed Zephyr on the condition of the engines, I told them I was very concerned about the idleness abuse. So when Charlie called me with the initial assessment, I had my fingers and toes crossed. I had a Texas-sized sigh of relief when I heard his very good comments of: "they are lovely really", "the crankcases are beautiful" and "the crankshafts are good." This is the ultimate proof that running engines at maximum power for air racing for hours and hours at a time did not damage these engines. Now, for years I've had people (not Lycoming) tell me that racing was bad for the engines. I can say from experience that I have not found that to be true. When the plane was racing, annual cost was minimal. It was only when the plane sat idle that the annuals got significantly more expensive. The only extra cost item on the overhaul was the cam shaft on the right engine needed slight grinding. When I asked Charlie why the right engine would have this and not the left, his best guess was that some rust had gotten in there and wore on it. I attribute this directly to not flying enough. He also commented that had we run much longer, we'd have been looking at replacing this very expensive and hard to find part. The oil analysis we run at each oil change had not shown any problems. The engines shipped exactly on schedule from Zephyr.

I also had the engine mounts (some folks call them engine baskets) overhauled. As I understand it, they are often overlooked at overhaul time. The expense was well worth it for two reasons: One, as 35-year-old pieces of metal they were chaffed by tie wraps, had some corrosion and some bent elements and two, the 'bent' portions were causing firewall damage that in turn had to be patched. The firewalls had been patched before and would be repaired again at this annual. Our mounts were original with the aircraft and that means they survived

all those rookie Twin Comanche pilot carrier-style landings. The mount shop we used was Kosola and Associates. Once again the expertise and customer service was exceptional. James was my primary contact and I was thrilled to hear they had a Twin Comanche engine mount specialist. James told me the lower Y-intersection bracing is quite challenging to get right. If it isn't done correctly, the mounts won't fit the engine mount bolts on the airframe. I paid the extra \$250 for powder coating. They were shipped exactly when promised. Kosola is another ICS supporter and Flyer advertiser. I held my breath at installation fitting and their work was flawless.



Looking Naked and Lonely.

Protecting the money spent

Because paying for the overhauls really gets your attention, it only makes sense to make sure the plane is being flown as correctly as possible, hence, the engine monitor and GAMljectors.

First, we had to make space for the monitor in the panel and that meant a trip to the avionics shop. The replacement of the King audio panel and Intercom with the Garmin 340, which combines both functions and leaves space for the engine monitor, was scheduled right before the overhaul. Our wonderful space-efficient (my new favorite phrase) panel needed four days instead of the two days forecasted and then four return trips to get the panel back to its operable condition. The folks at the avionics shop were real troopers and didn't charge a dime above the original quote. I admit that I spent some time privately cursing myself for this elective work because of the effort it took, but now I'm a fan of the new spilt-com function that I didn't know I wanted. It is wonderful when one of us is left seat talking to approach, the other pilot can pick up ATIS, monitor Unicom and make traffic announcements for landing at uncontrolled airports. It's a stress reducer in busy Class B airspace.

The JPI EDM-760 gives immediate gratification. It's a step-up from the 4- probe Alcor EGT. Charlie cautioned that the early numbers would drive us crazy right after overhaul and suggested covering it for awhile. I expect this gauge to help us run our engines at the right temperatures and to get the maximum service life. Two cautions: One, the EDM-760 is not approved to act as a replacement for the cylinder head or oil temperature gauges. JPI made a special note of this point in their instructions, on their STC and on their Web site. So if you are getting new engine monitoring equipment, make sure you and your shop understand the regulations because additional gauges that act as primary for cylinder head and oil temperatures are required for Twin Comanches. As a result of this issue, I had to buy a second set of different JPI probes (5050A) so the JPI probes and the factory probes would work in the same cylinder opening, so the #3 cylinders read about 30 degrees cooler. Ultimately, I replaced the factory CHT gauges and probes with the help of Jim at Air Parts of Lock Haven, Pa. The whole crew there was incredibly professional, had awesome hospitality and managed to go into the panel, perform flawless work AND leave the airplane in perfect operating condition. The second caution is if your laptop does not have a serial port, be sure to use the serial to USB cable recommended by JPI as the one we got at Best Buy did not work.

GAMljectors were also installed, but I haven't taken the time to do the work to have them tuned yet. I'm looking forward to evening out the fuel flows to each cylinder for the benefit of saving fuel and I'm also looking at the long run. Once upon a time – it seems like 100 years ago – I got a degree in physics. I'm looking for the GAMljectors to equalize the temperatures across all four cylinders for each engine via equal fuel flows and it is my hope that by having more equal temperatures, the engines will have less stress.



A look at the new engine and shiny mount.

We had the baffles replaced, too. Gee Bee provided the materials and did a great job at matching the baffle patterns for the LoPresti cowls installed in 1994. I've written about these cowls in the past and view them as the single best modification on the plane because of the improved cooling they provide the engines. After 60 hours from the overhaul and the change from mineral to regular oil, the engines were still running much hotter in climbs than they did prior to the overhaul. Since we were headed to AOPA Expo in Tampa anyway, we detoured to Vero Beach and visited the LoPresti brothers (another second generation aviation family). Steve and Rick worked on the baffles and now when we climb, the engines run 20 degrees cooler as a result of the LoPresti shop expertise.

The results

From engine shutdown to post-work flight was eight weeks. Engine break-in oil consumption started at one quart per three hours. Now that the engines have been run for 70 hours, on a 14-hour trip oil consumption was less than a quart per engine. I overhauled for safety reasons but had two pleasant surprises, with everything a bit tighter, true air speed reads five mph higher and takeoff rolls are shorter.

Hindsight is 20/20 and if I could do this project again, I would do nearly everything the same. I would definitely choose to work with Zephyr Engines again for all the reasons we chose them in the first place. Kosola and Associates, GAMI and GeeBee all provided great products and I would choose them again, as well. I hadn't planned on working with Air Parts of Lock Haven or LoPresti Speed Merchants as they are a long way from Fort Worth but when I needed experts to address issues, these folks were worth the flights.

Two things I would do differently are: overhaul in the winter and do a better job of selecting the JPI placement. Engine break-in procedures require developing 75 percent and greater manifold pressure. When you live in Texas in the summer, daily temperatures can be well into the low 100s and density altitude is a huge performance factor. Let's just say, I saw a LOT of sunrises in order to fly at cool enough temperatures to be at a reasonable altitude.

I placed the JPI EDM-760 in a hole that originally held the right RPM gauge, since we have a combined left and right RPM gauge. It almost fits there. The glareshield rides a little higher in that area now. In an ideal world, I would like to have mounted it lower in the panel or to the left of the radio stack. But hey, in an ideal world, I would have won the lottery by now so we could afford to redo the whole panel.

Since we've spent all this money on the airplane, I've made new commitments to fly it frequently. Thank goodness I've retired from IBM. Jealousy of my greater flight time this year may just be the incentive my husband needs to retire also. Just kidding.

Author Pat Keefer holds the FAI Gold Medal for the longest race in history with her mother, Marion Jayne. Past Flyer articles include 'Long Range Flying', 'Angel or Speed Demon' and 'Racing for Gold: 24 Days Around the World'. She is President of the U.S. Air Race, Inc www.us-airrace.org and RTW (Round the World), A Motivational Company. She can be reached at pkeefe@charter.net.