

Colors of Sunrise (Feb 2009) Patricia Jayne (Pat) Keefer, ICS #8899



Before and After: The last photo before going to the paint shop, used for comparison (top) and the comparative after (below).



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Twin Comanche PA-39, serial number 10 (N3322G), had its third paint job done 18 years ago. It looked great from 50 feet away, but up close it was apparent that parts added after the last paint job were not included in the original design, fiberglass parts needed repair, and some paint was chipping off. It was time for the fourth of the four big airplane expenses – new paint. The interior, engines and panel have already been done. This project was more sensitive than the previous three because the paint scheme was designed by world-record setting, Hall of Fame and 100 Aviation Hero for the 1st Century of Flight, Marion Jayne – known to me as Mom.

In addition to being a functional family heirloom, the Twin is a historically significant aircraft as the only U.S. plane to have raced twice around the world. It was the plane that enabled Mom and me to win FAI Gold Medals for the 1994 21,000 mile Round the World Air Race. Two museums have already offered it a home, but this is a fabulous flying machine that we plan on flying for at least another decade. The “we” is husband Ken and me. The purpose of this article is to share our experience, because like other big projects, this is one that is typically done once every 20 years or so.

Getting Started and Preparations

We tackled this project like all the others – we did research in eight different ways. We subscribed to Aviation Consumer, attended an AOPA convention paint seminar, read internet paint postings, got recommendations for paint shops, looked at paint jobs on aircraft on the ramp, looked at advertisements in the Comanche Flyer, visited paint shops, and talked to other owners. Any time we’re looking at writing a five-digit check, we get real serious about research.

When you get a quote, start by writing down the basics of the paint job and other work you want done: how many colors, general design thoughts, and the areas of the plane that may need repair. Each of these elements will influence your final bill. I also suggest understanding what the approval process is for additional areas that may be discovered as needing repair. Also ask if door jambs, baggage doors and other quasi-interior elements are included in the paintwork. Generally they aren’t, but you may want them done, so get a price. Since control surfaces will be removed, you might want to consider replacing worn control surface rod ends, brackets, etc. You’ll want to know if and what type of new screws and fasteners may be included in the pricing. This may also be the time to consider replacing your windshield. Comanche windshields are done from the outside, whereas the side windows are done from the inside. It is a good time for speed mods, as well.

In the three years we thought about and researched the paint job, we made a concerted effort to get as much work done on the airplane as possible so that once the new paint was on, the possibility of inadvertent damage being done, while other work was in process, would be minimized. The old oil quick drains were replaced. Since new avionics can mean new antennas, it was good to get the panel renovated first. It worked out that the 1,000 gear AD was due the year prior to the paint job.

The paint shop requests that the aircraft not receive wax or corrosion protection for at least six months prior to the paint appointment and fuel levels kept low enough so that no fuel expansion will occur during the paint job. My least favorite thought about the paint job was that the engines would sit still in a moist environment for several weeks, so with the statistics showing that the new Exxon Elite was a better oil for engines that aren’t run as often; I changed from AeroShell 15W50 several months in advance. The last flight before going to the paint shop was another oil change.

Painting is an expensive process. I suggest pre-paint photos be taken in detail to show all the areas of bad paint as memory joggers, so you know why you spent all that money. I also suggest detailed photos of all attachment areas including the weather-stripping so that when you return for inspection, you have a reference of what it looked like in the past. It really cuts down on questions. Bring the installation instructions for any modifications on your airplane so that reassembly is done correctly – your paint shop may or may not have experience with your mod.

Paint Design

The exciting, but stressful, part about a paint job is the design and paint color choice. It is difficult to visualize how the paint color from a one-inch square chip will look when it is spread across 27 feet of airplane, and it is equally tough to see how a design will flow across curved surfaces, moving parts and around two engines when you work from a two dimensional representation. The easiest thing to do is to use Piper designs – either the original or the current designs – because you have full-sized examples to assess. It is more challenging to choose to use a unique design as the risk of not enjoying the result is higher because it hasn't been done before.

Our goals were to enhance Mom's original unique design by adding color to the tip tanks and LoPresti cowls, and to improve the flow of the design. This is easy to write about, but hard to accomplish. We provided the overall design guidance and we went through many iterations of collaborative thoughts, added the experience of the paint shop owner and ultimately used roughly 80% of Mom's design and 20% of our own decisions and others thoughts.



In the stripper bay getting naked – off with the old paint.



This after-shot shows how the inboard cowl and stab design flow well.



N3322G's completed custom paint job.

The process Ken and I used for design decisions was to get input, print it out, and then go to the airport, stare at the Twin and try to imagine how the paint would look from the outside and from the cockpit. The week before we left, I actually drew on the plane to help visualize the impact of the changes. Tweaks were made all the way up to the week before paint was applied. Since we'll live with the very public results for maybe two decades, we were willing to take as much time as was needed. For us, the added expense of design assistance was worthwhile.

Choosing a Paint Shop

I was looking for several specific items with respect to the paint shop. I wanted them to use DuPont's Imron paint, again because I had first-hand knowledge of its durability. Since the FAA requires annual inspections, I wanted to facilitate those inspections by separately painting the inspection panels and by not painting the screws or fasteners. True, the paint job would look glossier without the interruption of screw head or cracks around panels, but it would only look that way for a maximum of 12 months; and then the next 20 years, paint would flake off the screw heads and may be damaged when inspection panels are removed. Since we'll live with the paint job for so many years, we wanted a high-quality job with a shop that will be around, when and if, touchups are needed. Knowing that so many parts would be removed, it was important to me that an experienced mechanic be a part of the paint shop staff. EPA compliance was another factor. Ultimately we wanted quality work without damage to other components. I expected to be welcome to visit the plane at any point in time.

When we visited the paint shop, the tour included a step-by-step description of the processes they use. I liked the quote process. The airplane was reviewed first so the quote was done with first-hand knowledge. It is also helpful to have a "best guess" allowance for fiberglass and metal repair work. This repair work always happens and budgeting for it up front helps reduce future financial surprises. Because we had some hidden damage, our final bill was about 10% higher. The downside of choosing an Aviation Consumer top-rated paint shop was we had a 15-month wait.

The Work and the Blog

What made sense to us was to have the annual done at the same time as the paint job – especially since the plane would be in so many pieces; there was Comanche expertise at the paint shop and the annual was expected to be "an easy one" – defined as only the 50-hour ADs and no major squawks. It was time to have the props overhauled again and I chose a Hartzell Service Center to do the work because they built the stuff and they offer free pickup and delivery anywhere in Ohio.

Having the props off eliminated one of the two large risks I saw posted on paint jobs, and that was getting stripper in the hub. It also makes it much easier for the paint shop to work around the Twin. I also recognize that each time the prop is moved, the oil is wiped off the cylinders to some extent and so the oil protection is lowered for an engine that will sit for a long time.

Shortly after the work started, Bruce Thurmann, South Central Tribe Chief, asked that I post progress notes on the paint job and annual. I hadn't done that before. Again my goal in doing so was to let others learn from our experience and hopefully make their life easier if a paint job is in their future. I was surprised that the blog grew to be the most viewed topic on the ICS Forum. The blog request encouraged nearly daily trips to the paint shop and a lot of photos to share the progress. It made me acutely aware of how much trust is placed in the paint shop that the roughly 100 pieces of the Twin will be reassembled correctly. That's a lot of trust to be placed in a shop we are doing business with for the first time.

The following steps took place:

- Removal of an estimated 100 parts and materials including: inspection panels, speed mods, tip tanks, stab tips, nose gear doors, fuel door closing mechanisms, strobe lights, welkey buttons, inspection panels, access panels, weather-stripping, static wicks, all control surfaces, cowls, chaff strips, chaff strip glue, gear well skirt, main tiedown loops, rotating beacon housing, air speed indicator, left stall strip, silicone and bondo.
- Paint was removed from metal, with chemicals, by sanding from tip tanks, gear, gear wells and fiberglass.
- Protection included: all openings; windows received double protection; cockpit door was foam sealed; interior was covered in plastic; engines and gear were bagged; fuel line connections, gear switches,

gear conduits, torque tube, fuel pumps, etc. were masked. Note that there are 10 tanks on this plane, so extra masking was required.

- Metal parts were etched. Each rivet was scrubbed in two directions.
- Metal parts were corrosion protected with alodine. The alodine was hand-massaged into skin laps.
- All parts were primed.
- The paint design was taped with all impacted parts pinned in place, but the parts were then removed and painted separately.
- All parts were painted, reassembled per Piper Service Manual, retraction tested and ground run tested.
- Detailed paint line cleanup and other imperfections were handled – windows polished, exterior part of door jambs painted, walkway applied, and spinners polished.

Regardless of the Comanche expertise of any paint shop, it helps to have the Piper Service Manual for your aircraft. It also helps to have Webco information handy in case any parts are needed. Since we've had damage in the past and the tow limits would be removed, I took special care to review the Comanche tow limits with the person who would move the plane.

Once again I learned how fortunate we are to have Comanches. I already knew that Cessnas did not have the same anti-corrosion protection inside that our Comanches do. I saw the inside of a Beech Debonair's wing. The skins have anti-corrosion, but the ribs and several other parts don't. For those who will sell their Comanche in the future, they ought to highlight this as another Comanche advantage.

We learned that the quality of the paint can vary due to not just surface preparation and application, but also based upon what ratios the paint is mixed, what primer is under the paint, and by what activators are used. The price of activators can vary from \$40 to \$300 per gallon. Guess which one gives the better depth of color? The price of paint also has significant variance. I was shown the DuPont catalog and prices had a 10-fold range.

When to Visit

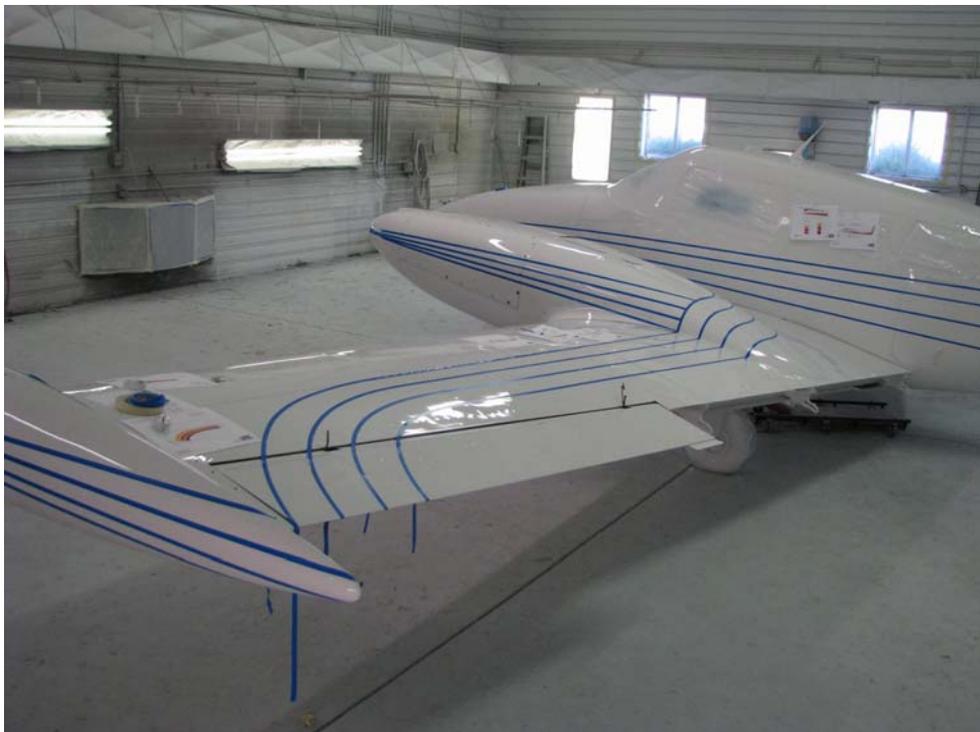
The most visually spectacular changes are when the airframe is stripped and the base coat of paint is applied, so they are the most exciting to see. From a knowledge and decision-making view, if your schedule permits, I would suggest staying for the disassembly so you can judge the need to replace any worn rod ends or brackets. It is also helpful to see the plane after stripping so that any damage can be assessed. Depending upon your emotional temperament, you may need to prepare yourself before your visit as it can be distressing to see your plane so "naked" and in so many pieces. I observed other owners with the startled deer-in-the-headlights look after visiting their stripped plane. This is also the point where I saw them second-guessing their choice of colors and design. They made no changes, but the uncertainty was consistently seen.

Post-Paint Checkout and Maintenance

Knowing that the plane had been in about 100 pieces, we double-teamed the post-paint preflight and I had a list of 37 areas to check, over and above a normal preflight such as baffle alignment, cowl flap operation, exhaust stack clearance, etc. Minor adjustments had to be made to a fuel door and a cowl flap which would have rubbed on the exhaust, and weep holes had to be cleaned out. We drained significantly more fuel than usual and found only very minor contamination, but chose to err on the side of caution. As is our custom, we flew an hour post-annual check flight with both of us on board and checked gear operation, etc.



The first layer of paint with some of the 100 removed parts.



The taped design – it was hard to envision the paint inside the lines.



Masked for the orange stripe – note the detailing around the strobe light.

We flew VFR only for the 30 days following picking up the plane because the quote says 21 days to cure, but we found outgassing still happening after 30 days. The paint shrinks as it cures and this was actually noticeable to me in the area of the nose opening.

With the new stainless steel screws and fasteners, I received Apex #2 bits and they work better because of the grippy flanges. The paint shop had paid tremendous attention to detail including the use of nylon washers under non-flush screw heads so the paint would not get ringed. Care of the paint will be a spray bottle of water and soft cloth for some time with Aviation Simple Green for behind the engines. The paint shop sent me home with containers of each color for touch-ups and I know what activators were used with the primer and paint. I bought some Wal-Mart towels to use while fueling to prevent belt buckle and jacket zipper rash. It is tempting to cover the plane to keep dust off even while it is in the hangar. Plastic covers can interact with paint and therefore destroy a paint job. Old bed sheets are recommended instead.

Since all paint was removed, placards/decals had to be replaced. FAA external labeling requirements vary by aircraft and there are none required on the Twin however, we prudently added the tow limits on the nose gear and “Do Not Lean” on the door. Other labels such as static ports, level points, etc. were discussed and declined.

What I'd Do Differently

Thank goodness I don't have to do this anytime again soon because I'd rather fly than have this much downtime. I/we would make all the same decisions except for two. I would not have the annual done at the same time because it extends the amount of time the engines sit idle both on the front and back ends of the paint process. Second, I would likely paint the nose gear parts, where the tow bar and tow equipment attach, silver because the paint in these areas was immediately destroyed at first use. A silver color would make the chips less noticeable. I had originally planned this and then vacillated several times before going with white.

The Results

The first court of public opinion was on Columbus' Rickenbacker Airport's ramp. AirNet's freight operation mechanics were at quitting time and they didn't go directly to their cars. About a dozen went the opposite way to the ramp to gape at the Twin. With very un-guy-like enthusiasm, they heaped praise on the Twin. My favorite quote was, "This is the most beautiful Twin Comanche I've ever seen." We agree.

When the paint is completely cured, the World Race logo will be added to the tail. This is a thoroughly custom paint job with historical and heirloom heritage. The swept design and graceful curves were chosen for the connotation of sleek speed. The bright red, orange and yellow colors honor the sense of excitement that begins with each new day. They are the colors of sunrise.