Windward Aviation is a maintenance facility led by ABS members Jim and Reese Leach, owners of a restored 1956 G35. Their facility is located at Palm Beach County Park (Lantana LNA) Airport in southeast Florida. Their staff specializes in single and twin piston engine Beech aircraft, regularly maintaining more than 100 Bonanzas, Debonairs and Musketeers and over 35 Barons and Travel Airs.

Windward Aviation hosts an ABS/ASF Service Clinic each winter and provides seminars at ABS Conventions and Southeast Bonanza Society functions.

MISSION: IT'S POSSIBLE

BY JIM AND REESE LEACH, WINDWARD AVIATION
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"There are forces of evil in the world ready to attack an aircraft at every turn. Your mission, Mr. Phelps, should you decide to accept it, is to determine who or what is behind aviation maintenance surprises and help owners avoid the pitfalls of aircraft ownership."

Okay, so that's a melodramatic way to begin a story about aircraft restoration. But those who have lived to tell the tale will most likely agree that restoration is not for the faint of heart. Your "baby" will be gone over from stem to stern. It will be disassembled, repaired and reassembled to correct years of the effects of nature, as well as some neglect and/or abuse. One thing is for sure: You will have a better, safer and more valuable aircraft than when you started.

In addition, as our aircraft age and require extensive restorations, the marketplace will begin to differentiate between an old aircraft and a fully restored, improved classic aircraft with many modern amenities.

This story began innocently enough in December 2001 when Windward Aviation bid an annual inspection and performing SB 27-3358 to remove the speed restriction imposed on early, short-cord ruddervator Bonanzas and a Beryl D'Shannon tip tank installation on N5243C, a 1950 B35 owned by Peter Scott. Mr. Scott is a British citizen and president of Heliscott, Ltd., a helicopter company in Great Britain. The Scotts reside part of the year in Central Florida. Mr. Scott has restored older automobiles and aircraft.

The local paint shop on the field, award-winning Florida Aero Paint, was also contracted by the owner to strip and

repaint the aircraft. The owner had scheduled some other structural repairs and avionics work to be completed at other facilities in January 2002.

Mr. Scott had returned to England, so we flew to Deland, Florida, in our G35 to pick up N5243C. The logbooks were in the possession of a local avionics shop that had recently installed a new radio, so they were unavailable when we picked up the aircraft.

To fit into the paint shop schedule, the aircraft was immediately made ready for paint by removing the flight controls.

Prepping for tip tank installation reveals problems

In its stripped condition, the aircraft was prepped for the tip tank installation. When we removed the old wing tips, we discovered both end ribs were cracked. We encounter broken wing tip ribs on about 20 percent of the tip tank jobs we do, so we did not consider this out of the ordinary.

Upon removing the left outboard rib, however, the next ribs inboard were also cracked. The "uh-oh" was definitely audible. Further investigation revealed the wing had been partially and improperly repaired.

We consulted ABS technical experts Arky Foulk and Neil Pobanz as well as Beech technical support. We were also fortunate to have available for consultation the Lantana Airport manager and president of Florida Airmotive, Owen Gassaway, a former Beechcraft dealer and repair station operator, and Charles Taylor, Master Mechanic Award winner. Their contributions to troubleshooting were invaluable.

It appeared the wing damage may have occurred during some type of ground handling. By that time, we had received the logbooks from the avionics shop and discovered they began in 1983, not 1950. No documentation existed for the repairs. Another "uh-oh" was heard.

Upon providing the owner with digital photos via e-mail and reviewing our options , we concluded wing replacement was the most cost-effective approach. A wing was located at a reputable salvage yard, Dodson International, and shipped in by truck. We examined the wing and made a minor repair to the leading edge where it had been damaged during a wind storm at the salvage yard.

The wing was mounted with new bolts, washers and nuts. The landing gear was reinstalled and the pitot system made operational. The left fuel cell was overhauled by Eagle Fuel Cells and installed in the wing cavity. Minor corrections were made to the electrical wiring, fuel sender and plumbing as required. The tip tank modification resumed.

Annual inspection progresses

Meanwhile, the annual inspection was progressing. We discovered damage in the right wing wheel well and below the right rudder pedals where the exhaust stack, if improperly rigged, can vibrate against the fuselage and eventually wear a hole in the skin. In addition, excessive corrosion warranted

Damaged flap drive cable

inner gear door and right engine cowling door replacement as well as repairing the baggage door.

The flap drives were replaced after numerous and improper repairs were discovered. These discrepancies, although not show stoppers, had to be addressed with parts from Beech, some combing of salvage yards and employing FAA-accepted repair techniques.

At this point, we believed we had seen the last of the surprises. After all, the engine had been installed within the last year, the owner hadn't reported any difficulties and our preflight inspection and subsequent flight hadn't turned up any concerns.

Upon routine examination of the oil filter as part of the annual inspection, however, we detected large quantities of metal—some ferrous, some not. The engine had to be removed for examination and probably overhaul. The "uh-oh" then changed to "Oh-no!"

Options for solving the problems

We discussed the options with the owner. These are not welcome conversations from either the maintenance shop's point of view or the owner's. We indicated the work yet to be performed would probably exceed the "as is" value of the aircraft. Bravely, Mr. Scott agreed to persevere and achieve the safe, restored aircraft of his dreams. He also agreed to provide progress payments to fund the work.

Mr. Scott selected Tropic Airpower, also located at

Crack in inner gear door....also intergranular corrosion has broken through. See hole in blister at center of door.

Lantana, to complete the overhaul. Continental does not provide a factory-remanufactured E-225-8 engine, so field overhaul is the only option. Not all engine shops work on the E-series engines in the early Bonanzas. Tropic Airpower had overhauled our own engine earlier in the year and we were satisfied customers.

Engine overhaul

The only surprise during the overhaul was discovering one of the cylinders was actually from a ground power unit, not an aircraft engine. No, that alteration wasn't mentioned in the logbook either. New cylinders as part of the overhaul brought the engine back to spec.

During the engine removal, we discovered numerous cracks in the nose wheel well and keel structure. This structure not only provides the cavity for the nose wheel to retract into, but also supports the engine mounts. The "uh-oh" became "Wow! What else?"

Now the records investigation became intense. How could this airplane that recently flew well have all these problems and few if any of them remedied to date?

We made a request via AOPA for the FAA accident report and a list of all FAA Form 337 Major Alteration and Repair filed for the aircraft. This is a valuable service provided by AOPA and should be requested, as well as the title search for every prepurchase inspection to turn up anomalies in records and uncover potential fraud or misrepresentation.

Sure enough, the aircraft had been involved in an "uncontrolled flight into terrain" back in 1974 in Colorado. No logbook entries or Form 337s were available reporting the eventual repairs. Criminal? Maybe. Shoddy? Definitely! Former owners and mechanics knew about the repairs (that, incidentally, were not well done), and then compounded the problems by not documenting them for the benefit of future owners and mechanics.

Past discrepancies ignored

Now, here's where it gets interesting or perhaps sickening. For 27 years, the aircraft had presumably undergone annual inspections and at least one engine change without these discrepancies being addressed. Ouch! As we mentioned earlier, Jim flew the aircraft uneventfully from Deland to Lantana. Gulp!

The Bonanza was indeed designed and fabricated with unprecedented strength and damage tolerance. As owners, let's not press our luck by relying on superb design and redundancy to keep us flying. We control most, if not all, maintenance decisions for our aircraft. Let's ask for it to be done right.

Hundreds of rivets later and boasting a new nose wheel well keel structure, the nose gear was reinstalled and the aircraft was "back on her legs" for the first time in over a month. Numerous landing gear adjustments and replacement of bushings and attaching hardware were made. These are common for Beechcraft away from the watchful care of experienced mechanics for even a few years. Attend an ABS/ASF Service Clinic if you suspect your Beechcraft may be in this category.

Attempts to properly adjust the landing gear and dynamic brake resulted in gear motor repair and gearbox overhaul. The damage found in the gearbox could probably be traced to the accident in 1974.

Required inspections and adjustments

While the engine overhaul was progressing, we began performing the inspections and adjustments required to comply with SB 27-3358 and subsequent AD 2002-21-13. The intent of the Airworthiness Directive and Service Bulletin is to address aging aircraft sheet metal after years of potential corrosion and the subsequent loss of metal thickness and strength. The work scope also covers the rigging and balance of the flight controls. Structural degradation and/or misrigging increase the likelihood for control surface and stabilizer flutter at higher airspeeds.

Skin thickness tests and attempts at flight control balancing resulted in the need to have both ailerons and ruddervators reskinned by Princeton Aviation. Both ailerons previously had been reskinned with aluminum, replacing the original magnesium skins with the old magnesium spar left in place.

The aluminum skin in contact with the magnesium spar and atmospheric moisture set up a galvanic reaction similar to a battery which accelerates corrosion. Also, the previous reskinning had been accomplished without proper jigging, resulting in the ailerons being slightly warped and rubbing the aileron coves.

The ultrasonic inspection of the aft empennage areas was performed by Lantana-based Palm Beach Aircraft Propeller technicians without need for reinforcement or repair. The final part of the Service Bulletin compliance involved rerigging the flight controls after paint. The right flap was replaced with a reskinned unit purchased from Dodson International as part of the original work scope.

Engine reinstallation

The engine reinstallation went as planned, including the overhauled propeller governor, accessories and T-drive. The removal and installation of an E-series engine does entail a bit more effort than the fuel-injected engines of newer Bonanza models. The accessories must be removed and reinstalled to allow clearance with the engine nacelle during installation.

Why bother with an E-series engine? Because the alternatives are very expensive and the ruggedness and fuel economy of the E-series installed in Bonanzas continues to impress owners.

The flaps

The last issue to be addressed had to do with the flaps. The straight 35s and A35s were configured for a maximum of 20-degrees flap travel. Beginning with the B35 in 1950, flap

Wing mating shown in progress.

travel was extended to 30 degrees. The Beech Parts Manual depicts the same wing assembly for the A35 and B35. The two models share the same Pilot's Operating Handbook (POH) without reference to the different flap track configurations in the performance section.

You guessed it: We had two A35 wings installed on our B35. Documentation for the previous wing changes was nonexistent, but we suspect they were made at the time of the 1974 accident.

The wing we replaced was also from an A35. We attempted to get resolution of the matter through Beechcraft and the FAA, but the only viable remedy was to replace the flap tracks with the 30-degree configuration to comply with the aircraft's Type Certificate.

The paint work went as scheduled and all flight controls were balanced. The new ruddervator balance guidelines in AD 2002-21-13 necessitated adding weight to the balance horns. All flight controls and landing gear doors were reinstalled and rigged.

The flight test

Now, to the fun part: the flight test. This concluding part of the job must be completed as orderly and professionally as any of the repairs. It is crucial that the test pilot(s) understand the scope of the repairs made and have plenty of flight experience in the type of aircraft being tested.

A stepped approach is highly recommended. Trying all systems at once on the first takeoff roll after a major restoration is nothing short of foolhardy. It is also recommended that the owner's insurance company be contacted prior to flight test and made aware of the increase in value of the aircraft.

Ultimately, the flight tests and adjustments are successful, and the owner receives his aircraft with all systems go and the aircraft handling better than ever imagined.

Summarizing the evils

After completing several restorations—not all as extensive as this one—here are the evils that increase the cost and reduce the safety and enjoyment of flying, not to mention the value of an aircraft:

- Corrosion
- Poor record keeping or no logbooks
- No pre-purchase inspection or a poor one
- Inexperienced or incompetent maintenance techniques used by both licensed and unlicensed mechanics
- Owners not knowing where to get competent maintenance
- Inadequate flying and maintenance budget for the aircraft
- Too many or improper modifications
- Impatience with work schedule
- Lack of pilot proficiency
- Unreported or undocumented incidents and accidents

Owners with the lowest maintenance costs per flight hour and safest airplanes keep them properly maintained and correct problems when they are small. Just remember, cracks and leaks never get better by themselves; they only get more costly and dangerous.

Learn from others, apply what you have learned. We can all do our part to make aviation safer, less costly and more fun. Enjoy and care for your Beechcraft. You own a classic!

The finished airplane with replaced parts arranged in front of it on the ground.