Caveat Emptor

RB “Doc” Hecker

EAA Technical Counselor #5453

EAA Flight Advisor #1905

Used Aircraft Engines

This is a tale of three woes…and how they concern both the best and worst of decision situations. The common thread surrounding this tale of woe is the dictum of Caveat Emptor, or, “Let the Buyer Beware”. Sometimes the most diligent research on how to approach a decision can still lead to a no man’s land of difficulty…and a compromise of safety as the ultimate outcome.

To begin with, when I originally purchased my 1946 Taylorcraft BC12-D over 6 years ago, it came with a fresh annual from a known mechanic and was pronounced “ready to fly”…and ready to fly it was. It was only after I had hangared the ship on my own field that it really was critically looked over by me and a friend who is also trusted mechanic. It soon became apparent that the inspection had been cursory as I had to remove mud dauber nests from the trim tab control cables. Further inspection showed worn bungee cords. The firewall forward was conspicuous for a missing cabin heater shroud, and the oil was dark. The aircraft was cleaned up, the engine oil changed, and cylinder compression checked. Although the magnetos were timed correctly, a disturbing tendency during the hand starts was that it took many propeller swings to get the machine to fire. Once these items had been corrected (or dealt with), the machine was a joy to fly. After about ten hours of flight, it was determined that the spars were damaged. The aircraft was taken out of service for a teardown and rebuild. The engine was totally disassembled. The findings on that engine were the beginnings of my first woe.

The Continental A65-8F is really an almost bullet proof gem of 1930’s technology. This engine has a tendency to run even when there are internal problems, and seems to provide good service to make up for its lack of horsepower. One point in its favor is that parts are still available for rebuilds, although cylinder assemblies are becoming dear. A major reason for this is the prior availability of Superior Air Parts selling their Millennium brand of new A65 cylinder
Assemblies that were manufactured in Italy. Those cylinders were sold in sets of 4, and required an exchange of the old cylinders. I assume that these old cores were then destroyed to ensure a further market for the new assemblies. Unfortunately, the A65 Millennium cylinders are no longer available.

Upon teardown of my A65-8F it became apparent that the engine needed work. The crankshaft was worn and the camshaft lobes were spalled. Both of the Continental case dowel bolts were missing and had been replaced with standard hardware. A cylinder stud assembly was broken. The oil relief spring was missing. All of the rocker arms needed to be bushed and refaced. All of the steel parts were sent for rework and the crankshaft was ground per STC to 0.020 with new .020 bearings supplied. The case and accessory case was sent for inspection and a small crack was repaired. The cylinder assemblies were sent out for inspection and (naturally) condemned. The cylinder shop happily sold me a set of new Millennium cylinders. The Bendix Scintilla lunchbox magnetos were sent out for inspection and one was condemned due to internal corrosion. Fortunately, the accessory shop had a spare magneto case on the shelf and rebuilt both magnetos to overhaul condition. This 60+ year old engine had been waiting for a long time to be properly cared for. The engine was carefully rebuilt with approved parts and was placed into service after a 3 year total restoration on the airframe.

This past year I completed another total airframe restoration project (Aeronca 7AC) that was powered by a Continental A65-8F. Although the engine ran well when I purchased the project, I removed the cylinders for inspection and had the magnetos reconditioned. Upon completion of the airframe restoration, I returned this engine to service. It appears to continue to run well. My intention was to run the engine until it told me it needed an overhaul as I knew that new cylinders were presently unavailable.

During the past year I was made aware of a spare Continental A65-8 available for sale at a local airport. This engine had originally been on a J-3 Piper Cub and had eventually migrated to a light sport Pietenpol. The owner had upgraded to a Continental C85, and was looking to sell his prior power plant. According to the logbooks, the engine had undergone a major overhaul 2 years ago and had approximately 102 hours time in service when it was removed from the Pietenpol. The engine logbook was original and the entries were properly noted. The engine was signed off as airworthy. The oil was fresh looking, and the mismatched magnetos and harnesses appeared in good condition. As the seller was looking to free up some cash for his project, we struck a deal that seemed reasonable to both of us. I purchased the engine with the intention of using it as a spare if the Aeronca 7AC’s engine needed to be worked in the near future. Once I had the engine back at my hangar, I ran it on a test bed to confirm normal operation, and then changed the oil with preservative fluid and stored the engine. I now felt that I had a good contingency plan if any of my two Continental A65-8F powered aircraft developed engine problems.

Last September, I underwent a long cross country (7 hours) in the BC12-D that took me from San Antonio, TX along the South Texas Rio Grande border, and then from Port Isabel, TX over the Laguna Madre Gulf Coast to Rockport, TX. The final leg was to my home base at Bulverde, TX where the airport landing graders reported that I was trailing smoke. Upon shutdown, oil was noted to be dripping from my exhaust stack. This engine had approximately 43 hours time in service since I had completed a major overhaul on it. A compression check showed there to be a problem with the #4 cylinder, and it was removed for inspection. My second woe was discovering that a piston ring had broken and severely scored the cylinder. Metal was found in the oil. The other three cylinders were removed for inspection and the entire set taken to the cylinder shop for evaluation. The very bad news was that the scored cylinder could not be repaired as Superior Air Parts did not have oversized rings for the Millennium A65. The entire set was shelved until Superior Air Parts decides to manufacture new assemblies or oversized rings.

Fortunately, I had my contingency engine available which was quickly swapped out on the BC12-D. The damaged engine was shelved for a rebuild in the distant future pending upon the availability of new cylinders. Unfortunately, this was only the beginning of the third woe that I was to experience.

After 7.5 hours of service on the contingency engine, it was time to do the annual on the BC12-D as it was due for inspection at the end of November. Beginning the inspection with firewall forward, the compression on the #2 cylinder was in the 20s. Upon changing the oil and inspecting the screen, I found obvious metal flakes. The #2 cylinder was removed and the rocker arm shaft appeared to be broken into two pieces. Upon closer inspection, the rocker arm shaft was really a jury rigged solution to a missing, correct shaft. The two pieces were non-aircraft parts (or some other aircraft parts) that were loose in the bushings (Figure 1). They obviously had undergone severe lash and had been ground down and scored – the source of my metal contamination. As this was really an unknown engine to me, the power plant was removed from the airframe and disassembled. What was found totally dismayed me. In addition to the obviously illegal repair of the rocker arm shaft with unapproved “parts”, all of the cylinders were found to have corrosion, and one of the piston faces was stamped “0.015”, but installed in a standard cylinder bore assembly. The lifting bodies were pitted and appeared unserviceable. The push rods had surface corrosion. The rocker arms needed to be re-bushed and faced. The crankshaft appeared normal, but a cam shaft lobe appeared to be severely worn. One of the through case dowels was missing and had been replaced by standard hardware. The
steel parts were sent out for inspection and the camshaft was condemned. A new camshaft was ordered. The cylinders assemblies were overhauled to 0.015" with proper rings ordered. The rocker arms were bushed and faced, and the pushrods cleaned to serviceable condition. New lifting bodies were ordered as where two new hydraulic tappet units. This previously “overhauled” engine with 109 hours on it turned out to be a complete piece of junk that potentially could have resulted in catastrophic engine failure in flight. It was obviously a field “piece parts” overhaul that was never serviceable. The reputation of the IA who signed off on this piece of work will be forever suspect to me. Fortunately for me, the seller immediately offered to offset some of my expenses as he had received this engine from the rebuilder in good faith, and had not personally been part of the overhaul experience.

So…where am I now? The best decision is that the Continental A65-8 contingency engine will be rebuilt by myself with the help of an IA to major overhaul standards with certified parts and hung on the BC12-D. My original Continental A65-8F engine on the BC12-D will also be rebuilt after I have received an overhauled set of Continental A65 cylinders. It is still possible to find overhauled assemblies – they are, unfortunately, just as expensive as the new Superior Air Parts Millennium cylinders were 6 years ago. By the way, Gibson Aviation, LLC of El Reno Oklahoma provides excellent cylinder repair and service. That engine will then be hung on the Aeronca 7AC. The worst decision I am faced with is that I am now essentially flying the Aeronca on another "unknown" engine until I have the 2nd engine rebuilt. The engine possibilities are only limited by time and money. The 3rd engine most likely will also need a rebuild. It appears that I am saving the little Continental A-65s one unit at a time.

“Caveat emptor”…let the buyer beware. When you buy a pig in a poke, there is no amount of lipstick that can make it right. Or, consider this…if you didn’t do the work yourself, it will always be suspect. Maybe that is why the FAA holds the owner / operator responsible for the airworthiness of our aircraft. It is time for me to arrange to sit for my A&P examinations. Now that is a good decision – hopefully with a successful outcome!
RB “Doc” Hecker (EAA 789419) is a FAA Senior AME (20969) who retired from the US Army Medical Department in 1997 after 26 years of service. He holds a Commercial / Instrument certificate for ASEL, AMEL and ASES. He has logged over 2,300 hours and prefers small, intimate airparks. He has restored a 1965 Cessna C210E (N4904U), a 1946 Taylorcraft BC12-D (NC43306), a 1946 Aeronca 7AC (NC2241E), refurbished a 1947 Taylorcraft BC12-D (N43928), and is currently restoring a 1947 Aeronca 7BC – L-19 (N119TX). His other projects include building a RV-8 (N51TX) and he is assisting in the restoration of a 1976 Taylorcraft F-19 (N3556T). He is currently preparing to test for the Certificated A&P Mechanic rating. He has previously owned a Cessna C-172 (N61785), a Grumman AA-5B (N74447) and a Mooney M20C (N10AD). In his free time, Doc practices medicine in San Antonio, TX. He is a member of EAA Chapter 35 of San Antonio, TX, EAA Chapter 92 of Orange, CA, and the Gulf Coast Wing of the Commemorative Air Force where he does sheet metal and fabric work on that magnificent war bird “Texas Raiders” (N7227C).

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