# The Best Trip Home That Didn't Happen

by

Andy Foster

## Part 1

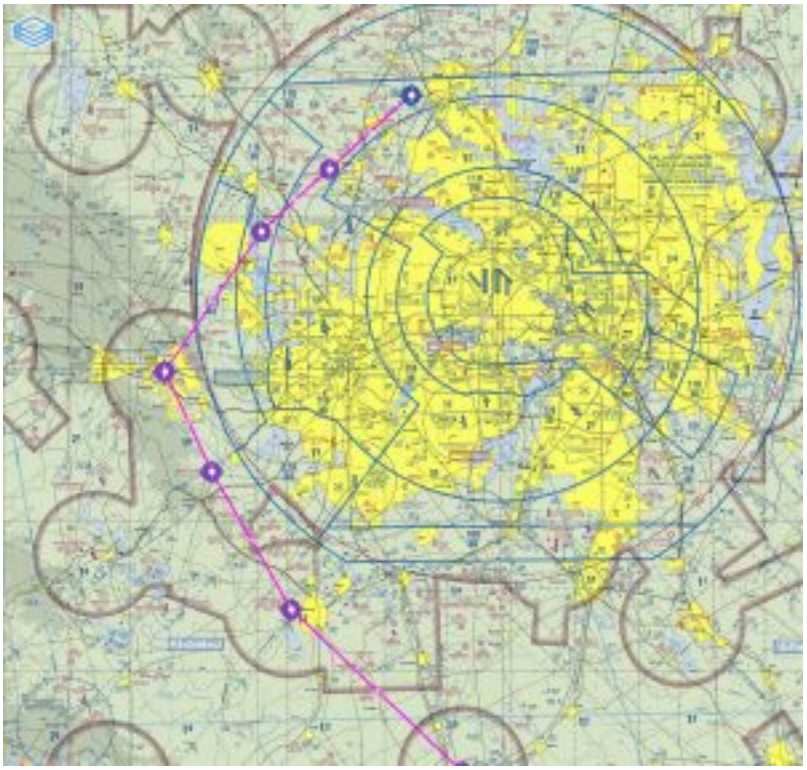
Our 2006 Flight Design CTSW in flight near San Leon, Texas.

Our Flight Design CTSW had been up in Denton, Texas for about five weeks getting her yearly conditional inspection, some preventative maintenance I wanted done, and replacement of all the rubber hoses used to run its Rotax 912 engine. I was ready for the airplane to come home. It had taken several weeks longer than expected due to weather delaying my delivery of the aircraft to the shop, a training interval for the mechanic, and a nasty surprise that developed during the last part of the work. A spark plug in the number four cylinder head had stripped during removal. (More on that in Part 3.)

The stripped spark plug removed from the #4 head.

The mechanic informed me that Rotax had removed any kind of repair of the spark plug cavity from the approved procedures, implying his only recourse was to replace the head. That added a week to the overall timeline and, worse, about two thousand dollars of expense we were not prepared for. I didn't see I had much choice if I wanted to fly the airplane out, so I approved the purchase and installation of the new head as he recommended.

Getting and retrieving an airplane from a shop some two hundred fifty miles away is always challenging, but I had taken it there because the mechanic was both Flight Design approved and Rotax certified. I had flown it up and my wife had arrived later by car to pick me up and continue a family trip to Missouri and Kentucky. Getting the airplane home became a bigger issue. It was a five-hour drive (another five hours to return), a ticket on Southwest airlines (that would cost about $250 and you still had to get to Denton) or someone in another small airplane had to fly me up.



My planned GPS course in and out of KDTO from KLVJ. It is designed to avoid any Class B or D airspace in case weather or ATC clearances preclude entry.

The shop had mentioned they had a 205 they might be able to give me a lift in; so, I asked about they might do that so I could go get the CT. That airplane wasn't available but they had someone else with an airplane who might be able to come get me; we arranged for me and that pilot to meet me at the Pearland FBO at 9 a.m. on Monday, July 3rd. He would be flying down in a Bonanza; it was a VERY nice F33A. He arrived and we left Pearland closer to 9:30 a.m., sneaking out under the floor of the Class B past West Houston airport, before eventually climbing to 4500 feet and leveling off. It was a very smooth ride, disturbed only by a few bumps due to the heat of the day. I was looking at the cumulus clouds dotting the skies around us while thinking about my trip back; daytime heating would grow them upward like flowers stretching for the sun. If I was quick getting back, I could get above them and avoid traveling in the hot, bumpy air below, something that would be impossible if they merged into a broken layer. Light Sport rules forbid overflying a ceiling so that you couldn't tell where you were over the ground by looking down. Once I got Basic Med under me, I could fly my Light Sport airplane under Private Pilot rules and cheat that, but for now…

David Shulman, the pilot and owner of the Bonanza, was a professional pilot, and he talked about how he got there as we headed north. He had every approach control frequency between Houston and Dallas memorized, and we monitored Houston and then Waco's approach controllers as we made our way. He aimed the airplane directly at Arlington's Class D airspace at the bottom of the Dallas Class B, descended to 2500 feet, and requested clearance through the area from the tower, which it quickly approved. As soon as we zipped past, we quickly descended to 1500 to crawl under the floor of DFW Class B as we headed toward

Ranger VOR, just south of Denton. Flying slightly west of a direct line to the fix to miss the western edges of the Surface to 10,000 DFW Class B, we traveled only a few minutes more before Denton was in sight and we were talking to their tower. They had us run a left downwind to runway 18 at two thousand feet and follow in some other traffic, which David did in a quick and professional manner. Moments later, we were shutting down his Bonanza on the ramp to the shop where my CT was; my airplane was sitting underneath an open hangar door in obvious anticipation of leaving soon today. I hoped to do exactly that.
After thanking David for a pleasant flight, I made my way to my airplane, did a quick look over, dropped my flight gear in its cockpit, found its mechanic, and had a chat. We discussed what had been done and how it had gone; he told me the logs were in the cockpit and the removed parts were there, too. I took a look at them and reviewed the log entries; happy with what I had found, I paid the bill (which was a bit lower than I had expected), and started preflighting the airplane. I didn't find anything unexpected, so I pulled the airplane out of the hangar and got the cockpit ready to go. I ran my weather brief from my phone, turned on my Go Pro, an external GPS, and an iPad mini, called "CLEAR PROP!" and started by airplane up. My main navigational instrument was a Garmin 496; when I powered it up, I could barely see its screen. Considering it unusable, I shut the airplane back down, popped the 496 out of its holder, and started stepping through its settings. The backlight had somehow gotten turned down; I ran it up, reinstalled it, and restarted the CT. Once I was happy everything was ready to go, I gave my airplane some throttle and started to taxi.

At the end of the ramp, I stopped and called Denton Ground for taxi, also informing them I'd be requesting flight following. Using flight following usually had given me the most direct routing to Pearland. Once I was airborne, Regional approach would ask me what heading I wanted; I'd tell them "one eight zero" and they'd clear me south just west of the DFW surface class B at 3500 feet. I'd hold that until I was out of their hair and then turn a bit southeast to point at the west side of Houston's Class B. Denton Ground gave me clearance to taxi and came back quickly with a squawk and a frequency for Regional, which I dutifully repeated back. I taxied south to the run-up area near the approach end of runway one-eight, did my take-off checks (including a run up, which was normal), dropped the flaps to fifteen degrees, and then taxied forward to the hold short where I gave tower a call. The controller asked me to "hold short", which I acknowledged, nudging the nose of the airplane to the right to be able to see down final better. One Cessna later, the tower cleared me to go; acknowledging the call, I pushed the throttle forward, steering a long arc to the left, and hitting full power as the aircraft reached the runway centerline. I rotated at 42 knots, and the airplane leaped off the runway, climbing away at about 800 fpm. Right at about a thousand feet AGL, the tower approved a right turn out for me and advised me to switch up to Regional departure. I turned, acknowledged, switched frequencies, and called Regional, reporting in passing seventeen hundred. Regional answered immediately, letting me know I was in radar contact and giving me the latest altimeter setting. I continued the climb up toward twenty-five hundred as the realization crept in that I wasn't going to be offered my usual course south. Must be holiday traffic, I thought. No worries. The course I was on would carry me southwest to the western edge of the Dallas Class B, where I would turn south and eventually southeast toward home.

I overflew Propwash and continued at 2500 feet until I hit Copeland where the floor of the Class B moved up to 5000. I shoved the throttle full forward to climb to 4500 feet and raised the nose to hold Vy. And when I did, I noticed both more vibration than usual and a barely perceptible series of “skips”. In all the time I’ve flown the CT, I had never felt anything like it. At my target altitude, I pushed the nose over to level flight; and as the airplane accelerated, I pulled the throttle back to cruise rpm, i.e., 5200. The vibration and the skipping went away.

I didn’t know what I had, but I knew something wasn’t normal. I continued to cruise level for a few more moments, but then pushed the throttle up to full power to see what would happen. The vibration seemed to return, vanishing as soon as I backed off the throttle even a little. Did I have a real problem here or not? After all, I had been out of my airplane for five weeks and I knew I was a bit reactive, knowing the head had been changed out and the most likely time for any issue is after someone’s done major work on your airplane. I felt like something was wrong, and I needed more assurance there wasn’t before I continued to trek toward Houston. I rolled into a medium bank right and pulled the power back, called Regional to let them know I was stopping my progress but didn’t get an answer, and descended to 2500 feet before leveling off heading southwest again. Regional called and asked what my on-course heading was going to be; not yet ready to abandon the idea of continuing home, I responded I would be turning to 180 shortly and then shoved the throttle to full to climb back to 4500 feet. Oil pressure, oil temperature, and cylinder head temperatures all were normal; but once again, the vibration returned at full power. After a few moments of experiencing it, I turned right, arcing back to head back to Denton in a descending turn that leveled at 2500 feet.

By now, my gyrations had gotten the attention of Regional approach, and the controller asked me if I needed any assistance because she was showing me heading northeast. I told her I had a problem “but it wasn’t big” and I was returning to Denton. She asked me if I needed assistance there and I responded in the negative; I didn’t feel I was in “emergency” territory yet, though I was prepared to go there if needed. I pushed the throttle up to full power as I cruised back toward the field at 3500 feet; the RPM pushed up to 5200 but that’s where it stayed. I felt like I usually would see the engine creep higher than that at this altitude; I was more convinced than ever something wasn’t right.

Because the Rotax 912 engine has twin carburetors that have to stay in sync, vibration issues are often due to the carbs being out of it. I had experienced that in flight when an air tube that keeps them together popped loose; there was a very increased vibration in the midrange, about 4000 RPM; at operation below or above that range, it smoothed out. It didn’t feel like what was happening; and though I couldn’t rule a carburetor issue out, I also knew that the most likely place for an issue was in the head since that component had been recently changed. It was a lesson I had learned not only as a pilot but as a NASA safety engineer dealing with the space shuttle; we often performed a risk analysis (though I didn’t do that one personally) to examine what a maintenance activity would perturb before approving its implementation.

The engine was producing good power and the gauges still looked good, but I was hedging my bets by staying at 3500 feet as long as possible. (The Class B floor was 4000 there.) My next

checkpoint was Propwash, an airpark with a single north/south runway, and I could see its white block buildings clustered around the runway. Regional called, recommending I start a VFR descent, which I did. It was accompanied by the smell of burning oil. I had never smelled that before when flying the CTSW, and I now knew the situation was bit more serious than I had first thought.

Insert shows gauge location. Background shot shows start of approach into Denton. Look at where the “green” ranges are. Engine gauges are showing nothing unusual even though I’m smelling burning oil.

I dialed up the tower, reported my position, and requested a full stop landing. The tower gave me an immediate clearance to land. There were several aircraft in the pattern with me, and the tower controller mentioned as I swung into downwind that he had a departure to get out, which I thought I saw sitting at the hold short. The last thing I was going to do was allow a downwind extension to get a departure out…so I was keyed to declare an emergency as I passed abeam the approach threshold. Before I had to say anything, the tower asked me to make an immediate right base to help them with sequencing, and I happily and immediately complied. I kept the flaps up to keep up my approach speed and get on the ground sooner; I made an uneventful landing and taxied back to the shop the trip had started from.

I shut down the CT, got out, and opened the little oil door in the cowling to see the inside full of smoke.

I sauntered off to find some mechanics; mine had gone to lunch but the head guy was there, working on another airplane. After telling him I had experienced some “abnormal vibration and loss of power”, I pulled out my iPhone, texted my wife to tell her I had returned to Denton because of a problem, and looked over at the CT. Oil was flowing down the nosegear strut!! I took a picture and then fetched the head mechanic and he did the same as he also called my mechanic back from lunch.

The CTSW nosegear strut covered with oil from the leaking seal some minutes after landing.

When my mechanic got there, it only took him about a minute to pinpoint the oil leak; one of the push rod tube seals on the head that had been replaced was leaking. He said he had used seals that didn’t have a shelf life, pondering whether there might have been a material failure, and that pinching during installation was also a possibility.

The push rod seal after removal with damaged areas shown.

In any case, I left it up to him to go work. I wasn't going anywhere else in the CTSW today; that was for sure.

While the head guy worked on getting me home, I grabbed my flight bag and my gear and walked up to the FBO that had some air conditioning to be comfortable while I waited. David agreed to run me back home later in the day; but he couldn't get there until 6 p.m., so I spent the next four hours thinking that, while I was not happy about the problem or the additional delay getting my airplane home, I was very happy the incident had turned out okay and neither me nor my airplane had gotten hurt. I had discussed the failure with the mechanic; when I had suggested to him that the ultimate result of pressing ahead would have been engine oil starvation and seizure, he agreed and said he could not tell me how long I would have had before I would have encountered it. The one thing we both felt was right was…I would not have made it home without becoming a nightly news story, either because I performed an emergency landing (either successfully or unsuccessfully) or had chosen to use the airplane's Ballistic Recovery System.

I had made the right decision…not only because of my experience as a pilot but because of my experience as a NASA safety engineer at the MER Safety Console during the Columbia accident. The engineer actually on duty when the crew was lost was Dave Witwer, one of my best friends, a fellow pilot and CFI who now flies for United. He and I had many talks about the value of following your feelings and taking action when you feel something is wrong. We are both strong believers in the value of intuition, which is often confused in the engineering community

as operating on “emotion”. They are not the same. Intuition is the subconscious synthesis of your experience and knowledge; when the data is not there or is lying to you, it may be all you have. You ignore it at your own peril; paying attention to it can often save your life. In this case, it saved both me and my airplane. And the role my intuition would play in getting this whole thing resolved was not over, yet…

## Part 2

The repair of the CTSW took about another week. The shop had run out of push rod tube seals, so we lost a couple of days waiting on some to arrive. The repair itself only took a day or so once they got there; but Houston swings between days of good weather and bad in cycles during the summer and the good days had passed while we were waiting. Between a couple of weathered-in days and my desire to limit work impacts as much possible, the next attempt to get the airplane home looked to be on the weekend. Most of our weather was due to afternoon thunderstorms firing up, so leaving Denton in the morning made the most sense. That meant I’d have to either get up there the night before and stay overnight or get up there early in the morning and try to get back as fast as I could. To make things worse, the shop said they didn’t have any way to assist with the trip up until the following week. Allowing the whole thing to drag out until then would mean impacts to both my work and personal schedules I wanted to avoid, so my wife and I started exploring ways to get me up to Denton to fetch the airplane at the lowest cost. We had enough points in our airline accounts to pay for a ticket on Southwest Airlines for only a few bucks, so we used it to buy me a ticket up on Saturday morning, July 8th. I got one for a flight that arrived at Dallas Love at 8:30 in the morning.

The shop didn’t typically work on Saturday; but they were trying to move some other work forward so there would be folks there who could let me have my airplane. I didn’t think there was much chance of getting a ride from them when they were manning with a skeleton crew and didn’t want to depend on it; after looking at what ground transportation was available and what each cost, it wouldn’t cost me any more to rent a car than renting a ride, so that’s what I did. It would be a one way trip and I’d drop the car at the FBO. Having a car would also give me some options about getting lunch or a room if things went awry and I had to spend the night.

My wife dropped me at Houston Hobby at a little before six thirty on the Saturday morning. I was carrying only my flight gear and had positioned it plus anything else that might trigger a TSA security alarm in my flight bag so I could send it through their X-ray. I breezed through security and got to my gate to find our 737 already there. There were probably only about 40 people total on the whole flight, so getting a window seat was not a problem nor was launching on time.

I was keenly interested in the weather on the flight up; most of it seemed to be active to the east of Houston, i.e. good news for me if it stayed that way. We landed at Dallas Love a few minutes early and I beat feet out of the Terminal to the car rental busses, barely missing the one for Hertz rental as I stepped outside. A good fifteen minutes later, one showed up again and I rode it to the Hertz rental counter where my car was already waiting. I spent a few

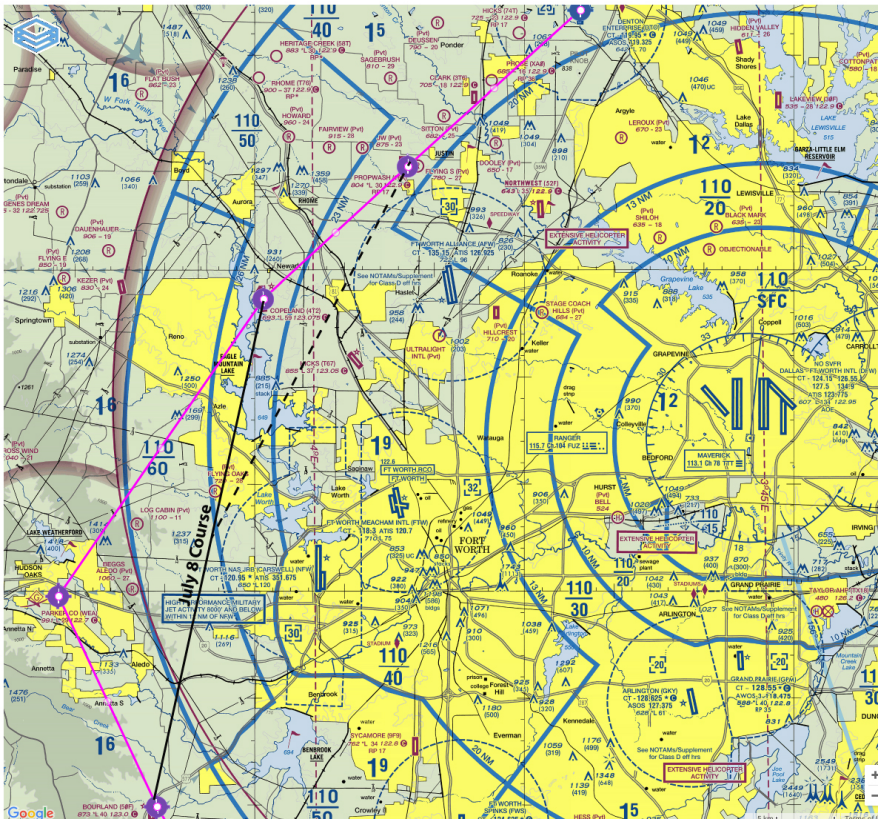
minutes checking her for damage and a few more checking her controls before plugging in a route to the Denton airport on the iPhone. It said I'd be there in 38 minutes. That was a lie; I-35 North was destroyed for construction and it took me an hour and 45 minutes to roll up to the shop and get out, hoping the mechanics were still there. They were; but they didn't know I was coming, so they spent a few minutes on the phone making sure letting me have the airplane was okay while I performed a very thorough preflight, including a visual inspection of the engine compartment with the upper cowling off. There were no oil leaks anywhere and the oil level was at the top, right where I wanted it to be. Having a full tank of oil meant extra time in the air in the event of another leak.

By the time I got the preflight and weather briefings done, it was approaching lunch time. I had only snacked at breakfast time, so I felt I needed some real food to take with me since it would take close to three hours to get home. I needed to top off the fuel in the rental car anyway, so I headed out for a Chevron gas station some few miles away that I knew also had a Subway sandwich shop. I fueled up the car, got a sandwich and a bottle of cold water, and hustled back to the airfield where I turned in the car at the FBO (with some qualms in case I had to return but couldn't see a good way to both hang onto it and turn it in as promised). I walked down to the shop and the CTSW, got the cockpit and me ready, and started the airplane up. After completing the post-start checklist, including getting courses laid into all my nav gear and the Go Pro camera started again, I taxied out for takeoff as I had a week before except I had no intention of overflying the area to the south. My plan was to fly out to the southwest as I had before and not to request flight following to leave me freer to deal with the airplane.

After completing my takeoff checks and taxiing up to the runway, I called the tower for takeoff. The controller told me to hold short again and asked me for my direction of flight, to which I responded "southwest". A few moments after a Cessna transited in front of me down the runway, the controller issues me a "maintain runway heading and no delay" takeoff clearance with traffic inbound at one mile, which I accepted as I gunned the airplane forward, hitting full throttle as I rolled onto the runway centerline. Everything felt good, and the little CTSW lifted off quickly, climbing up several hundred feet before I retracted her flaps while continuing straight ahead. When the tower controller called me for a right turn, I rolled into it at her command before acknowledging it on the radios. Like I had before. I continued climbing to 2500 feet while heading southwest, switching off to Unicom frequencies when outside 8 miles.

I continued southwest over Propwash and onward to Copeland, where I again started a climb to 4500 feet while turning southwest. I had altered my planned course slightly to make it direct shot from Copeland to Bourland, closer to but clear of the Class D airspace belonging to Fort Worth NAS JRB, which I like to call Navy Fort Worth. I punched up the tower frequency and was surprised by the number of requests to transit their airspace, many of which were from departures from Fort Worth Meacham's airport immediately to its east. The climb to 4500 feet was completely normal, and I started to relax, thinking that my problems with the CT might be over at last. I flew out from under the Dallas Class B's southwestern ring and, with Bourland in sight, pushed the throttles up for a climb to 5500 as I swung more southeast.

Once again, I felt the vibration, the slight skipping, that I had seen before. I pulled the throttle back and started a right hand descending turn to return the way I had come. It was back to Denton again, no matter how much I hated to do it. Like last time, the gauges were showing me nothing unusual, and the engine was purring along like nothing was wrong as long as the throttle was not at full. I leveled the airplane down at 3500 and went to full throttle to see what I would get; the vibration returned and the RPM seemed to hang. I backed off the throttle, putting her at normal cruise, and pointed the nose east of Copeland, trying to run more directly back to Denton. The direct line clipped the Fort Worth Alliance Class B which I could stay above; instead I elected to fly a little bit northeast of the line rather than risk any kind of infringement. My nose stayed ready to sense the smell of burning oil, but I never did. I pulled into the left downwind for runway 18 paralleling a Cessna inside my right wing; the tower had him turn in close and first and I followed him around the corner to another safe landing.




The hangar doors at the shop were still open but no one seemed to be there. I stopped my airplane and shut her down and found one mechanic working on a Cessna Mustang who I explained to what had happened. As I unloaded my gear again, I checked the nosegear and saw another oil leak running down the strut at the same spot as before. Whatever was happening was BUSTING the seal! At that moment, any doubt I had about where the problem was located disappeared. I was very certain the problem was in the head, something I told the head mechanic when I got him on the phone. We also now knew that the problem wouldn't appear until the airplane had been airborne for thirty to forty-five minutes, suggesting to both me and

the head honcho that it was related to the overall thermal load, i.e., heat soakback, in the engine; and we knew it was busting the push rod seal. He responded that he knew what it was, i.e., a valve sticking open that was overpressurizing the push rod tube and then causing the seal to leak. I had seen valve problems in cars when racing as a kid, and I concurred with his analysis. We now could explain every symptom we were seeing. If we didn't have the exact cause, we were damned close to it! He said he'd talk to the mechanic on Monday and, in the meantime, see what he could do about getting me back home. Unfortunately for me, he wasn't able to come up with anything; so I re-rented my car, got a hotel room in Denton for the night, and wound up buying a ticket home on Southwest Airlines. Not the outcome I was looking for; but I once again was happy both me and the airplane were okay and I was convinced we were now on the right track to solving the problem.

## Part 3

About ten days later, the airplane was fixed again. The mechanic had gone back in, rechecked the valves, and discovered that neither the intake or the exhaust valves were getting a complete seal. He had reworked them, done several ground runs over thirty minutes long, and had seen no issues. To be absolutely sure they had a fix, they decided to test fly the airplane and contacted Scott, a Light Sport pilot and instructor who had worked for them in the past and whom I personally knew, to fly the flight. Once I was sure Scott would be covered by my insurance, I okayed the flight, contingent upon him calling me and making sure we set up good test conditions. He did, and I shared with him everything I knew and had seen. A day or so later, both he and the mechanic manned up the CT and flew for a one hour and twelve-minute flight, performing multiple climbs up to 7500 feet. They were convinced there were no issues, so they talked Scott into flying the CTSW to Houston if I would run him over to Covey Trails, a pretty little airpark northwest of Pearland and Sugarland and on the west side of Houston. I agreed. It was a small price to pay not to have to go through the hassle of getting the CTSW back from Denton. We scheduled the flight for Wednesday morning, July 19th. Scott hoped to launch about 7 am and get to Pearland about 9 in a two-hour flight. It was theoretically possible to do it if you cut straight through the Class B with either no headwinds or winds in your favor, but I was skeptical it would actually happen that fast.

Scott launched only a few minutes later than he had hoped to; at about eight a.m., I received a text with a picture of the instrument panel and a comment: "Ugh! It'll be a little while….". I could see his groundspeed was 103 knots, his estimated time of arrival was one hour and fifty-six minutes, he was cruising level at 5500 feet, and he was just clearing the south side of the Dallas Class B. He didn't feel or see he had any issues. Another text a few minutes later showed about the engine gauges: 5200 RPM, CHT at 180 degrees F, Oil Temp at 200 degrees, and Oil Pressure at 50 psi. Those were all normal readings.

I texted him back saying: "Dude, this is LIGHT SPORT!"

A little before nine-thirty in the morning, I left my house and drove out to the airfield where I parked my car at my hangar and walked over to the FBO. Inside, a radio was feeding in traffic calls; I heard him call five miles west and request the active runway: someone else called they were using runway 14 and Scott latched on. Even though I've seen plenty of photos of what the CT looks like in flight, I am always curious to see it for myself, so I walked outside and watched him cross the field directly over my head. Banking left, he swung into the downwind and expertly flew the base and final legs, making a gentle landing on one four before turning off on taxiway Bravo and heading for the FBO. I took a couple of cell phone shots of him coming toward me as I looked for any traces of oil in case the repair had not gone as thought. As he spun the airplane around a few feet away, I saw that the bottom quarter of the whole left side was covered in oil. Apparently, the oil had been leaking for a while because it had saturated a piece of white "speed tape" used to cover a gap between the rear fuselage and the lower tail cone and its front end was flopping loose. After Scott shut the airplane down and was unstrapping, I stepped up to his window and said: "Dude, you've got oil all down the left side of the airplane!"


"WHAT….?!" He stammered, as he then climbed out. We both took out our cell phones and snapped pictures. Once I got evidence of oil saturating the fuselage, I looked in the oil door to see if I could see where oil was hitting the inner cowling (I could and tried to take a cell phone picture of it that didn't turn out.) and then popped open the door to the left baggage compartment to find, much to my surprise, the compartment was coated with oil. I momentarily panicked as I realized that the canvas satchel containing the aircraft logs were there and its top had been left unzipped open, calming down as I examined it and saw that the oil hadn't gotten in. There was a roll of "speed tape" in the compartment that wasn't exactly in

good shape, and I pulled it aside to dry it off and see if it was salvageable. I wiped down what oil I could off the side of the compartment and the oil that had run down the baggage compartment door and collected in a little pool on the bottom of a rim. I had a spare liter of oil in that compartment, so I pulled it out to use on the next step.

Returning to the cowling, I opened the oil door and checked the engine's oil level on the oil dipstick. Scott grunted as we both saw the stick was completely dry. I added 200 ml and checked again. Still dry. 400 ml more. Still dry. The rest of the liter. That topped it off! I asked Scott where the oil level was when he took off; he answered it was in the middle of the cutout section of the stick, which defines the Min to Max quantity. He thought that meant he took off half a liter low; but a check of the difference between Min and max is .43 liters, so a spot in the middle would mean he took off only .22 liters low. That meant the airplane had shed .78 liters of oil, 26 % of its total oil capacity.

With the oil level temporarily topped off, I started my wounded airplane up and taxied her back to my hangar. Once we had her buttoned up, Scott and I piled into my 2014 Mustang convertible and headed for Covey Trails. Unfortunately, our twenty-minute flight turned into about a two hour road trip for Scott and a four hour road trip for me, though Covey trails was one of the prettiest airparks I had ever seen. Too bad I didn't get to do a grass field landing there. (Caveat: To anyone who's thinking about dropping in unannounced, better bring $100 cash with you. That's their "landing fee" unless one of the residents at the place vouches for you.)

Round 4 Begins…

The shop where I had the work done and I conversed for about a week about how this was now going to get resolved. They first said were coming down on Friday, July 21 but then pushed back to Tuesday the 25th because they were "waiting for parts". Since no one had been down to examine the airplane and do a preliminary failure analysis, I had questions about what parts they were bringing but didn't get an answer. I hoped that meant they were bringing everything they needed to completely rebuild the head. While there was every reason to think that the third oil leak was associated with a root cause we hadn't mitigated or hadn't identified, there was no guarantee of it. It could be that the continued operation of the engine with a fault had triggered another failure mode. Additionally, while the shop had been stepping up to get me transportation most of the time and take care of the issue, I wasn't feeling there was any sense of urgency about getting my aircraft back up in the air, especially after I got a note from the mechanic that he was going on vacation on the 27th and started mentioning August 7th as the next date for us to pursue anything. I hadn't fussed at them much until I got that, but I did then and let them know I was going to pursue "alternative remedies" soon. I wasn't kidding; I had selected an aviation attorney to go have a conversation with, though going down that road was the vehicle of last resort. I was also talking to a local Rotax certified mechanic to see if he could "get her done", even if I had to pay him out of my pocket, assuming he would come to Pearland to work.

Thankfully, the business owner for the shop that had done the work stepped in. I got a call from the head mechanic apologizing for the inconvenience (not the first time he had done that) and telling me the owner was flying him and the mechanic down on Wednesday, July 26th to get the airplane up in the air. I was told that no matter what the problem was (and even if something else had gone awry), they would return the aircraft the service. That was a huge relief to me. I personally liked the mechanic and still had confidence in him (though I wasn't convinced he didn't have some blind spots—who doesn't?), so I was happy to hear they appeared to be REALLY stepping up to the bar! It's when things are going to hell in a handbasket you really see the character of a person or a company; and this one was looking like one I wanted to continue to do business with (though I would reserve final judgement until we actually got a resolution).

They came, they went, and **the airplane leaked again**…!!

## Part 4

*I learned to pay attention to a little ditty when I was involved in Naval Aviation that goes like this: "It only takes one dumbsh*t to wipe out a thousand "atta'boys"." That was about to apply to this evolution, as you shall see.*

I was pretty impressed that the owner of the shop had flown the mechanic involved with this whole thing and his boss (also a mechanic and an IA) in a Citation down to fix my airplane. They roared in about 11 a.m., jet blast reversers screaming them to a stop, and pulled into a parking spot near the FBO. My hangar is only a short walk away, so I headed toward the jet to escort them to my CT. After shaking hands, saying "hello", and thanking the mechanics for coming, I walked them back to my airplane. They did a quick inspection that couldn't reveal much; it had been a week since the airplane had flown and any oil that might help them pinpoint the leak had disappeared. So, we pulled the airplane out of the hangar, pointed the tail at only empty grass, and started the engine.


Even though the ambient temperature was already in the nineties and climbing toward the century mark, it still took a few minutes before the engine hit its minimum operating temperature so the mechanic could open up the throttle while the IA searched for a leak. And found one. Unlike the other leaks, which had been at a single push rod seal at the bottom of a tube, this one was coming from the top; it was inside the head. They would have to not only

take the head off but remove the push rod tubes and reseal them. The mechanic said he needed Loctite 620 to do that; and he didn't have any. (So much for delaying five days to make sure they had the right parts.) The IA started immediately saying they'd "have to come back", which meant to me they had no hesitancy about putting my airplane down for two more weeks; despite what had happened, the mechanic was going on a two week vacation the next day! I couldn't believe what I was hearing and was determined not to let them off the hook easily; what sense did it make…especially after they had flown down in a Citation…to simply declare defeat and walk away before trying to see what could be done? I suggested they go to a nearby mechanic's shop and see if there was any down there or if someone could tell us where we could get some locally before throwing it the towel. They didn't want to do that. The IA asked the mechanic what Loctite would work, and after some checking, he said any 600 series Loctite would. From my hazy memory came a nagging that I had some Loctite, though I wasn't sure what type or where it was. I found it after a short search; it was a bottle of Loctite 648. Giving them now no reason not to proceed, they took it and started taking the head apart.

The first words I got about how long it would take to do the repair was a couple of hours; so, after going over and meeting the shop's owner to thank him for coming down and checking on whether I could do anything for them, I left to grab some lunch. When I got back, I sat and waited for the job to finish up, hoping to take the airplane for a short hop around the pattern to verify the fix. When the job was almost complete, they finally told me the airplane needed to sit for at least 24 hours for the Loctite to completely cure. That meant they would have to leave anyway, and I would once again be left with an unairworthy airplane for an uncertain and already LONG length of time. The IA promised to come back to perform a leak check in the next few days. I encouraged him to do just that.

The end of the week came with the IA saying couldn't get transport down. Since he was convinced all we were after was a leak check, he asked if I would allow a mechanic's shop on my field to assign someone to do the leak check whose time he would pay for. Wanting to move forward, I agreed. A day later, the local guy and I went out to the CT and, after I pulled the engine through and checked the oil, pulled it out of the hangar. As he inspected it closely to get a good look at its condition, I saw him hesitate as he looked in the area of the push rod tubes; but he didn't say anything. I got in the CT, started it up, sat waiting for the engine to warm up, and then signaled him I was going to run it up. He nodded and I did, advancing the throttle in steps as he watched for leaks. When I shut the engine down, he called me aside and showed me where we had a new leak. This was back at the push rod seal…AGAIN!

"I thought that seal looked a little rolled up," he said.

We put the airplane back up and I got on the phone with the IA in Dentin. He wasn't sure how he was going to tackle it now with his Rotax certified mechanic gone. He admitted it was his problem, and I sent him a link to a website he could use to search for Rotax certified mechanics anywhere to help him out.

I gave him a day to work the problem and then got in touch with him again. He stated he was legal to do the repair himself and planned to have someone fly him down in a King Air in a day or two so he could. But as the time approached and the King Air ride didn't work out, he said he didn't have a way to get there (despite the fact that Southwest Airlines was flying multiple flights to Hobby every day and he could drive down in five hours if he was really motivated), so he asked if he could hire someone at KLVJ to do the work. Since I personally knew the mechanic who did the leak check had Rotax experience if not a formal certification and I was convinced having someone local pursue it was a better course, I agreed. I spoke to the owner of the local shop and he was fine with doing the work, though it would be the middle of the next week before he could get to it. Since that was about the same time the Denton crew could get to it if they pressed ahead, I didn't see we'd gain anything by having the guys in Denton fly down; and, frankly, I felt it was time to move the work to someone with fresh eyes and hands.

I wrote an e-mail that included both shop owners and the Denton mechanic who had been so far unsuccessful at completing the work and discussed how I saw us proceeding if we had an issue after the next attempt to close it out. Bringing someone else in held the potential for complicating things if there was still an issue, especially since the airplane had not been flown since the push rod tubes had been reinstalled. I proposed a three way conversation for any issue, and that if anyone involved didn't agree with what I was proposing, then we needed to halt moving forward in this manner. I didn't hear anything back. I figured that, in actuality, no matter what the result, the original shop still would have legal responsibility to resolve the matter, especially since the second shop was working on their behalf. I knew I was taking some risk going this way, but I didn't see I would be risking any more than I would by bringing the original mechanic back in. He had made already made FOUR attempts to "get her done". I was just glad the shop manager (the IA) was standing behind their work regardless and was at least making some effort to get it all resolved.

ROUND 5

Ten days later, nothing had happened. The owner of the local shop decided he didn't want to get in the middle of it; and while I didn't blame him for that, I was irritated at him for promising to get it done in a week and then not telling me he had decided not to work on the plane. I didn't find out until I called the Denton shop and informed them nothing was happening. The owner of the Denton shop said he would come down on Thursday or Friday of that week but then shuffled the job back to the original mechanic who couldn't come until Tuesday of the week following. (God forbid someone consider driving down from Denton on the weekend to get her done, even though almost sixty days had passed since this mess started.) On the Tuesday morning of the planned visit, I got a text as I waited to hear the mechanic was airborne that said instead he had wrecked his car on the way to the airport and wouldn't make it. I responded that I was glad he was okay and also texted the shop manager and asked him to call me. A hour or two later, I called the IA and told him I didn't think it was wise to continue to send the original mechanic and reminded him of his promise to come down and finish the job for him. He said he heard me and would get back to me with his next plan.

In the meantime, Hurricane Harvey spun up in the Gulf, making one of my worst fears about this continuing debacle come true. The un-airworthy state of my aircraft meant that flying her out of harm's way was impossible, and I would have to take my lumps and hope her hangar would protect her. I won't go through the horror show that Harvey was; and, obviously, the fate of one's aircraft pales in comparison to trying to keep yourself and your loved ones safe and water out of your home. We were some of the most fortunate ones; we got no water in our house. Though we were trapped in the house for days, we had plenty of food and water and power the whole time. As it became clear we weren't going to have to call for a water rescue, Harvey left, and the water began to recede, so my attention turned first to our cars (which didn't get flooded though the carpeting in my convertible did get soaked by overflow from some drains) and then the airplane. A flooded Clear Creek not far from us cut us off reaching the airport, so there was no information about our airplane's fate for days. As things were calming down, I texted the owner of the hangar and asked him if he could see its security cameras and, hence, our airplanes; while he had lost his internet connection, another pilot in my hangar had been out to it and let us know all the airplanes were untouched. It was a few more days before the creek receded enough to allow me to drive out to the airport and see for myself.

It was only a day or two later that Hurricane Irma formed; and as it barreled west, some of the early computer model runs were spewing out the possibility that Houston might be in its path. This prompted me to make an angry phone call to the guys at the Denton shop to light a fire and get them down here. I wanted the airplane ready to fly out; considering what we had been through, there was no way I was going to consider remaining in Houston if we were in for another hurricane hit. The problem mechanic said he'd be down on the following Tuesday (about a week later). I was expecting that to be the first day back at work and so I told them I needed for them to make their own arrangements to get around. I heard nothing until that Tuesday morning when I got an e-mail from the mechanic saying he wasn't coming because he couldn't get a rental car. I sent him back a very irritated e-mail telling him he should have called me and gotten on the airplane, and started a text conversation with his boss as well. Having finally reached the end of my patience, I told them they had until 1800 Friday to get my airplane up or I would take legal action against them (I did indeed have an attorney picked out.). They got the mechanic on a flight down on Southwest the next day. I made arrangements with my boss to do some work from home and take a short day to make it all work.

The mechanic FINALLY did make it the next day, and I picked him up at Hobby, drove him to my hangar, and left him to work. I asked him to call me about 20 minutes before he was ready to do a run-up to check his work; he said he would. Two hours later, I decided to see what was going on and returned to the airport to find the CT sitting outside the hangar getting ready for her run. After some initial problems getting the airplane to start, I got the engine running and we checked her out. The seal did not appear to be leaking. We talked about me doing a few trips around the pattern to verify the fix and I agreed to it, at least until I checked the winds and found them gusting up to the airplane's demonstrated crosswind limit. I was exhausted from all I had been through and decided flying in those conditions wasn't a good idea. So, we buttoned

up the cowling, I taxied her out, and we did a full power static run instead. Again, there were no leaks; so I taxied the airplane back to the hangar and out her up. By then it was lunch time, so I took both of us over to Chick Fil A and then dropped the mechanic off at Hobby to catch his flight back to Denton.

## Conclusion

The next Saturday (after I had returned from a trip to Reno, Nevada to attend the Tailhook Association's 2017 convention and a reunion dinner of my Navy fighter squadron), I performed a quick "check flight" consisting of two touch and go's and one full stop landing in our local pattern. There were no oil leaks and engine performance felt and sounded normal.

On Sunday, I came back out to take a longer flight involving some climbs at least up to 2500 ft; but as I headed out to the southeast to my favorite practice area, the CTSW began emitting a strange howling noise I had never heard before. Once again, I turned around and headed back to the airport. The winds were out of the north so we were landing on three –two; as I approached the airport, I heard and saw no other airplanes in the pattern so I made a bee-line for the end of the runway to get back on the ground. I landed without incident, taxied back to the hangar, pulled the cowling off with the help of my wife, performed a full power static run up, and listened for the noise. I didn't hear it. That suggested to me that the noise was probably due to something associated with the airframe. It sounded like it was coming from an area

above and ahead of my left ear, though I really wasn't sure that it wasn't transmitting through to there from somewhere else. Pointing toward it, though, was the fact that the wings had been pulled off as part of the conditional inspection. I couldn't dismiss the probability that something had not being properly sealed up, especially considering everything else that had happened.

Judging it to be more of an annoyance than a safety risk, I launched again with my Go Pro mounted in the cockpit and recording. The sound showed up as I moved past ninety knots. I varied the power and heard no change in the noise but then noticed it decreased with airspeed. After landing, I took all the video I had and put together two clips. One began with footage that illustrated normal cockpit sounds and noise level but then switched to footage that contained the new noise. The other was a shorter clip from a flight that caught the noise starting up. I posted both clips to You Tube and then posted them to my aircraft's online owner's forum along with a question asking if anyone could identify the noise. Two owners, one of them a well-known CT mechanic, responded almost immediately. They both identified it as "tape noise". Bolus tape is used to seal small gaps between several of the aircraft's aerodynamic structures, the wing/fuselage joint being one of them. I was told to inspect the tape for any cracks or sections that weren't sealing against the surfaces. Somewhere, the air was exciting the tape so it was acting like a reed in a musical instrument. It was hard for me to believe that tape could make a noise that loud, but I trusted what they were telling me and did an inspection the next day.

I didn't find anything telling. I did notice the mechanic had used on a single strand of tape to seal the wings (versus multiple layers used previously), and that the tape in the front gap looked more depressed, even if it didn't appear broken. I laid another strand of tape over the first, overlapping about 80% of it and the edge against the inner part of the wing. I took off and didn't go far before the sound came back, though it delayed its appearance until 110 knots. After returning to the ground, I overlapped the other side of the original tape and the new layer so both strands were partially overlapped and ensured the seals against the lower fuselage were really tight and the tape ran all the way back to a bracket at the flaps, as the mechanic had instructed me to do. I launched out again and the noise did not show up, no matter what speed I flew. Once back on the ground, I laid one additional layer of tape over the installation on the other wing to hopefully ensure the same problem did not develop there later on.

***Conclusion***

All the problems seemed to be licked. The only thing I still felt I needed to do was put enough time on the engine while airborne air to ensure the push rod tube sealing at the head was good. So, I planned a flight from Pearland to Brenham via Houston Southwest and Lane to provide me that assurance. As I was checking tire pressures for that flight, I inadvertently pushed the nosewheel tire stem sideways and its joint ruptured, deflating the tire in in instant. (OMG!) It's a small tire and I could not locate a tube for it at any local store, so I had to order one online and lost ANOTHER week! Luckily, the guys over at Air Professionals at the airport jumped on it and got her done as soon as I got the parts, and I finally launched out on that "check flight"

eleven (COUNT 'EM….11!) weeks after the airplane had been released from its conditional. I performed climbs to 1500, 2500, and 6500 feet, followed on the return with a climb to 5500 feet right after takeoff followed by a high speed, near idle descent to continuous low altitude cruise at 5400 RPM, 100 RPM below the engine's maximum continuous operating limit (and the RPM I typically fly at in a headwind). I returned to Pearland about two hours after I took off and immediately got out and checked for oil leaks. There were NONE! What a RELIEF! Finally, all this crap appeared to be over; and I could go back to JUST FLYING!

I was grateful to the shop that performed the conditional that they hung in until most of it had been resolved, but I was more than unhappy with the time it had taken to get it all resolved and the low priority they had given the whole affair, especially considering it was all due to their errors (five in all), and how they stopped communicating when they didn't have an answer. I was convinced that the mechanic knew his stuff but I was also convinced the whole thing had occurred because he rushed all the work and took shortcuts to complete it. Because of that, I will not return my aircraft to them for any work nor will I recommend them to any other Light Sport owners, even though they are manufacturer approved.

Here are my other "take-aways" from all this.

**1. Don't ignore what your gut is telling you; follow it!** Believe me, when I first started feeling something was wrong, I didn't instantaneously snap to the right answer, I wanted to ensure I was right, something you really can't do. (Better dead than look bad?) I did take the time to investigate what was happening; but as I discovered that there were several small clues the airplane had an issue, I knew it was in my best interest to do what my gut was telling me to do, a lesson often hard learned through my life experience, including being in the middle of the space shuttle Columbia accident. And I did it not once but TWICE! While you can argue about what the oil leak rate was, what you can't argue is there was a real if not totally quantifiable possibility of oil starvation and engine failure and whatever outcome that might have brought. When dealing with both machines and people, sometimes it's the small things that you pick on that prove to be the most telling. Better to put your aircraft on the ground and be safe and wrong than stay in the air and be dead and right. ("I thought something was wrong…)

**2. Knowing your aircraft and its systems involves not only what's in your head but what's in your senses and your experience.** This was demonstrated in the small kinesthetic and audio clues that triggered my awareness while the gauges appeared to be telling me there was no problem. The motto in the space shuttle Mission Engineering Room (MER) during the Columbia era was: "In God we trust; all others bring data." While that often does make sense, the Columbia accident (and the Challenger accident) and this experience showed there are often limits to that approach, and like most things invented by humans, nothing is absolute. It took me a long time to learn the hard way that to ignore what my senses are telling me (and they are giving me a very valuable but different forms of input) is as big a mistake as failing to reason things out. Sometimes, the data you need to make a logical decision just isn't there. Welcome to Life!

**3. You're a pilot, a passenger, or CARGO!** At different times, we all vacillate between those three states. It usually doesn't kill us. But life does present those moments when you MUST become the pilot or failure to do so can have definite and sometimes serious consequences. As aviators, we often have to deal with other people who are in authority or have our fate in their hands. Sometimes the right thing to do is trust and follow; sometimes the right thing to do is rebel and take charge. How do you know when to do the latter? Go back to bullet point #1; when your gut is telling you something is wrong. In that case, be the pilot! Tell the air traffic controller you can't or won't comply (UNABLE or declare an EMERGENCY) or the mechanic where you think the problem is. Yes, there may be some pushback but ultimately no one is going to keep you safe but you. That doesn't mean other folks won't help you and you can thank them when and if they do; it's that we're all human and nobody's perfect. BTW, if you sit on your hands and don't say anything, even that you're concerned, then you've moved from being a "passenger" to CARGO. Don't complain to anyone if you get mishandled.

**4. Stay cool and take it one step at a time!** It's one thing to think ahead to what can happen next and anticipate it; it's quite another to overreact and elevate your risk beyond what is necessary to meet the moment. Bias your options toward the worst case; but be careful you don't take it so far you create a BIGGER problem. Yes, sometime this involves your best guess, but that's what your training is for. Stay with what you know and do what you need to in order to stay safe, including sacrificing the aircraft. Walking away is all that matters.

**5. Have the patience to stay with it until it is COMPLETELY resolved.** In all my years of owning and flying aircraft, this was the situation that tried my patience and my endurance the most. There were several times I was so exhausted and frustrated I almost turned it into a legal case, something I didn't want to do and I knew would mainly be a win for the attorney. It also became so tiring that I was temped to do what was EASIER and shortcut the measures I felt needed to be taken to validate the aircraft's safety and ASSUME that things were okay without proof. I could not do so without putting me and, more importantly, the people I care about (and others on the ground I didn't know) at jeopardy that could be avoided. In the end, I followed each issue to a resolution and performed a "check flight" campaign I felt would push out any remaining flaws. I pushed the aircraft and engine into flight profiles similar to some flown on my more difficult cross-country flights, giving me some confidence I could re-employ the aircraft without undue concern in the same manner.

Eternal vigilance is not only the price of freedom but the cost of aviation.