

June 11, 2019

I made the decision to add the Electroair (EA) Electronic Ignition System to my turbonormalized setup after having had chats with a few other "early adopters" who raved about it, and also after spending some quality time on the phone with the folks at EA as well. I would assume the Surefly system would also confer similar benefits in some ways, but I can only speak to my experience with the EA STC.

One of the major performance benefits of an EIS, namely the ability of the system to advance/retard timing is much more relevant to a normally aspirated engine, because as altitude increases and MP drops, the system compensates for dropping MP by changing timing. In a TN, the engine always "thinks" it's at sea level, so this feature isn't really relevant. But there are other benefits, and my impression is that the EA STC delivers on everything that it promises.

I purchased the kit through Smooth Power, LLC. They are the North American dealer for EA. The folks there were a pleasure to work with, knew lots about the system, and kept their promise about delivery time. I was able to purchase the system with an "Oshkosh special," which meant a slight break in the price, and they threw in the keyless push-button starter as part of the deal.

The kit comes in several iterations... you can elect to replace one of the mags with their proprietary box to send timing info to the ignition coil packs, or you can get the same information from an adapter gear that sits mounted between the prop hub and the front of the crankcase. Not all props can fit that attachment... I have the Hartzell Super Scimitar prop and this is one of the props that do not support that version. So when ordering, confirm which version you need. You also have the choice of Tempest massive or fine wire plugs. EA says that their version of either is proprietary to the system, and they do not recommend using just off-the-shelf plugs. I opted for the fine wires, since the "Oshkosh special" also included plugs for a significant discount. The kit also includes proprietary ignition harnesses designed for the huge voltage created with each ignition event.

EA has created a network of "approved installers" around the US. Although I can't imagine why any A&P couldn't do this install, it is quite complex, and I believe they prefer to have you use one of their approved installers to ensure consistent conformity with the STC. I heard a number of estimates on labor hours... ranging from 20 hours (highly doubtful any shop could get it done this quickly) to 35 hours, depending on the shop's experience with the install. I negotiated labor hours ahead of time so there would be no surprises later, although I agreed that if something unforeseen during the install should arise that we could re-negotiate that.

Depending on how busy your engine compartment is, there might be issues with getting everything to fit. For me, because I have the old-style factory air as well as all of the TN plumbing behind the engine, some serious re-routing of plumbing and hardware had to occur. (You can see this in one of the photos I will upload.) There has to be enough room on the firewall to install the coil packs, and two empty circuit breaker spots are required in your subpanel.

The first issue we ran into was my tachometer. I had the Horizon digital tach, and it is incompatible with

the kit. Period. EA has apparently tried very hard to get Horizon to work with them to solve the incompatibility, but Horizon has refused to work it out. I myself called, emailed, and wrote to Horizon as well, also asking for them to find a work-around, and sadly, Horizon never responded to ANY of my communications. Pretty poor customer relations if you ask me, and really frustrating to be quite frank. Most other tachs are compatible, including JPI. My JPI is an 830, and because it is "advisory" only, I had to purchase another tach to replace my Horizon tach to have a "legal" tach. I decided to go with the Electronics International tach, although there were other choices. A JPI-930 would also work. Double-check this before you install so you have no surprises/delays.

The second issue we ran into was locating some of the electronics. The only room I had left was where my old FM radio/cassette player lived above the glove box (don't mock me...it still worked), but that had to get ripped out. By ripping that out, and ripping out what was left of my ADF (don't mock me, it worked), that freed up the two circuit breaker slots required.

I had gotten some PMs about how to route the ignition harness from another A&P who has installed some of these. That person had suggested a somewhat complex routing of the harnesses to avoid RMI interference. But apparently, while this may have been an issue with earlier versions of the harnesses (the blue ones), EA has switched to a more robust harness (the red ones), which appear to have eliminated this issue. I certainly saw no ignition issues or radio issues as high as 17,500 feet which is high as I have taken it so far.

EA claims that the system enhances how fuel is combusted in the cylinder and that this enhances engine performance. The bottom line is that they claim that you can either go faster on the same fuel flow, or stay at the same airspeed at a somewhat reduced flow. I have now been able to fly it for a few hours to collect enough data, and I agree that the system delivers on everything that they claim! (The implication is that the same amount of fuel is combusting more efficiently, so the engine is able to produce more work which creates more thrust, but also more heat. More on that shortly.)

START-UP: The system has a complex algorithm to enhance starting. If you're interested, you can read about what it does on their website. You flip on the mag switch and the EIS switch, flip on your Battery and alternator switches, prime as you normally would, and then push the start button... there is no key anymore and that's pretty cool. It starts on the second or third blade every time. I was trouble-shooting some prop governor issues after my annual, and so had to do a number of hot starts. These are now a non-event. It just starts.

TAKE-OFF: I asked the folks in the tower to watch where I lifted off the runway, and at the same weight as I measured previously, I am consistently wheels off the runway with about a 7-8% shorter ground run... roughly 100' less runway used than before. 100' may not seem like a lot, but might come in handy in a pinch.

CLIMB: At sea level, I am seeing somewhere between 200-250 FPM better climb rate. I will post a picture below that I took during my initial departure out of KTOA yesterday. To comply with their noise abatement procedures, I have to reduce RPM to 2500. I was getting 850-900 FPM climb rate at 2500 RPM. In my larded up luxo-liner A36, I would have previously gotten that climb rate at 2700 RPM. At

2700 RPM, I am now getting about 1100 FPM at sea level, all the way up to 15,500 feet which is as high as I went yesterday. So climbs to altitude will now take significantly less time than before.

CRUISE: At the same fuel flow, I am seeing a 4-5 KIAS increase in speed. Below, I am providing a link to before and after videos I uploaded to YouTube. I was lucky to have two flights where the ambient conditions were identical, so the only difference is the EIS itself. In the first video I was getting 145-146 KIAS on 16GPH, and in the after video it's 149-150 KIAS. If you look carefully at the JPI, the CHTs are about 20 degrees hotter in the after video, but still way below 380. A reduction of a little less than 1 GPH brought the IAS back to pre-install speeds, and also decreased CHTs too. So you can either go a little faster on the same FF, or reduce FF and keep the speed you had before. From what I have been told, the remaining mag only contributes about 10% to the combustion event, so there's very little difference in operation when doing a LOP mag check using just the EIS side. When running on just the mag without the EIS, it's the same as before.

BONUSES: 1) The plane is notably smoother, almost turbine smooth. Not that it was a jalopy before, but it's soooooo smooth now. The subtle "cycle-to-cycle" variability that is there when you operate LOP is almost imperceptible now. And at 10,500 feet WOT/2500 RPM, I was able to dial the FF back to about 10.5 GPH and it was still smooth, although quite slow. 2) The plane is also noticeably quieter. I had not heard of this benefit, otherwise I would have gotten a dB meter and taken before measurements, but Jeff H***** (of BPPP fame who also was the 'test pilot' for the first flight) noticed it too.

So the system appears to do everything it claims to do. A NA airplane would benefit even more from the ability to change timing with altitude, but there are clearly benefits for a TN bird too. I have been told that a TN550 could expect to see more like a 6-7 KIAS increase in speed because it can flow at least 1 more GPH than I can in my 520. Obviously I can't verify that, but that seems like a reasonable claim.

DOWNSIDES: 1) I lost 2 pounds of usable weight. 2) Oil changes are now going to be a bitch, because the oil filter is so packed in there that some plumbing will have to be removed to get to it.

Bottom line... is it worth it? It's not cheap. I'm guessing it costs about 2AMUs per knot increase in speed. But there are other benefits, plus the cool factor... so for me, yes it was absolutely worth it. Pictures and links to follow.

Cheers,
Jamie MacDougall