



RECORD OF COMMUNICATIONS

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Date: January 17, 2017
Person Contacted: Mr. Stephen Adams (Previous owner N176PA)
NTSB Accident Number: WPR17FA041

Narrative: The following are verbatim excerpts (in sequence) from several emails between the NTSB and Mr. Adams on this date:

Query From NTSB

Im trying to reconcile the as-found airspeed indicator (ASI) markings with those published in the POH that was recovered in the wreckage

As you can see (Below) there are some discrepancies between the two

It would be helpful if you could add any info/explanations to help me understand this

I recall that you stated that you had re-done the panel-

- a) Did you have the ASI redone?
- b) If so, do you recall the source of the ASI colored arc ranges?
- c) As you can see, the POH only specifies a "full flap operating range" which is not the same as the flap operating range – do you know the source of the white arc/flap operating range (55 to 120)?

AS-FOUND vs POH

- The ASI face was labeled and graduated in "knots"
- The ASI was manufactured with a white face. A marginally-visible (non-prominent) yellowish arc, presumed to be the normal white (flap operating range) arc, appeared to extend from 55 knots to 120 knots
- The remaining ASI colored arc markings were as follows:
 - o Green: 57 to 195
 - o Yellow: 195 to 230
 - o Redline: 230
- The POH recovered in the wreckage listed the following limiting airspeed ranges (in KCAS)
 - o White (cited as "Full flap operating range"): 50 to 87

- o Green: 104 to 151
- o Yellow: 123 to 151
- o Redline: 204
- The POH also cited the following limiting or operating airspeeds (in KCAS)
 - o Stall speed landing configuration: 50
 - o Clean stall speed: 55
 - o Maneuvering speed: 123

Response From Previous Owner

I think I found a picture [See Fig 1] that might be super helpful! When I programmed the EFIS, I used the ASI markings. You can see the markings on the EFIS and ASI matched.

Also attached is the checklist [See Checklists at end of this document] I gave [the accident pilot] I have no idea if he used it or one was found in the plane.

I used the marked ASI indicators. That is what the previous owner (2nd owner) explained that the builder explained to him as good and much safer. I did ask Daryl (Forgot his last name) at the Express factory. He said on the S-90's and 2000's that 195 Vno and 225Vne was an approved speed. I always thought the 87 KCAS max flaps speed was ridiculous. I used 90kts as a ref speed, stall speed dirty (observed) was nowhere near 55 KCAS. I observed about 70kts for a full stall with full flaps and power at idle. With a ref speed of 1.3 Vso, 90 kts worked great. And it allowed for a very controlled full stall flare. I can assure you the plane wouldn't fly at 55KCAS!

The flap speed was also from the factory, they cleared me for full flaps at 120. But I did read about a Glasair III that had a flap asymmetry and rolled and crashed on final. So I was fairly careful to not go full flaps until 100kts. But that shouldn't have had an effect on takeoff.

Not sure if you could tell, but I always took off with 10-20deg of flaps. He might have gotten slow as he raised flaps and induced a stall, because that would have been about where you raise flaps (500-1k' agl)

Here is another video done by somebody in the express community. This was an Express CT (cruciform tail) that has a smaller wing, but still very similar

<https://www.youtube.com/watch?v=S4DjZ7pDFn4>

That significant difference is why I gave him the VG's and encouraged him to have them installed.

I have no idea why the factory would put out a POH with those #'s, but they are bad!

Feel free to give me a call tomorrow if you'd like, I'd be more than willing to discuss. I am pretty sure I'm the only CFI with any significant Express time and I would love the community to learn something from this.

Query From NTSB (previous owner's responses embedded in red)

A) In looking at your EFIS, it looks like theres a pitch trim indication on the R/H side of the flight data display. I presume that the red/pink block (only) is the indication of trim position on that yellow vertical scale, and that the black, left-pointing arrowhead is an altitude indication. Can you confirm/deny/elaborate please? The red/yellow arrow is an indication of what the autopilot is asking for. There was no autotrim, so if it was out of trim, that block would pop up, telling you to trim. 10 down was very minor, I think the scale was 0-100 and it always indicated something, but only with the autopilot.

B) What are the angled white lines and numerals (1, 3) just left of the vertical yellow scale? I am guessing vertical speed, but can you please clarify? Yes, that is the VSI, but in that picture it is level.

C) The two airspeeds (171 on the EFIS, 168-ish on the round dial) differ a bit- do you know whether they had the same source, and whether the diff is a parallax and/or electromechanical issue? They came from the same source, only a single pitot tube. I would suspect that the difference was just the minor difference in gauges.

D) I recall in one telecon you mentioned that you stalled and/or did approaches-to-stall in this airplane, but i don't recall whether you did it with this pilot – can you please clarify? Yes, I did approach stalls many times, including with Bill. We did full break stalls, and even had him hold aft (falling leaf) to show that he had full control authority, power off in a stall. Bill had no problem, and I don't remember him chasing a wing drop with aileron, he flew them just fine from what I remember. We did not do departure stalls, but I did focus on 90kts as a min initial climb or approach speed, and he didn't have any problem maintaining a correct speed.

E) Do you recall whether the prop spinner was metal or composite? We didn't find any of it Composite.

F) Do you recall what the max flap deflection (in degrees) was? Or was that not documented anywhere? Not documented, but I would guess 30-40deg. No indicator, just look at the wing. I told him to keep about 2" split between neutral aileron and the trailing edge of the flap. Slight more or less wouldn't affect it much, even with flaps up, I think 2500' of runway would be enough. It would be exciting, but it would still get off the ground.

I spoke with a friend of the pilot who had about 150 hrs in his own S90, and flew w the ax pilot about 2 weeks b4 the ax. He stated that both used an estimated 10-20 degs of flaps for T/O. There was no cockpit flap deflection indicator, only the pilot's eyes/judgement out the window

The local damage was such that we couldn't definitively tell what the impact flap setting was.

Query from NTSB

Is the checklist that you provided one that you developed (particularly the speeds?) if so do you recall where you got those Vs & Vso values?

In the checklist, it lists two stall speeds, Vs & Vso

Checklist	
<u>Airspeed and Engine Limits</u>	
Vne	220 KIAS
Va	130
Vfe	123
Vs	85
Vso	70
Vg	90
Vref	85
Vx	110
Vy	120
Vrot	80

The FAA definitions for those are:

Vs means the stalling speed or the minimum steady flight speed at which the airplane is controllable.

Vso means the stalling speed or the minimum steady flight speed in the landing configuration

The ASI white arc started (this is specified as the stall speed in the landing configuration) on N176PA at 55, which isn't either of the speeds cited in the checklist

SO im trying to understand what the checklist meant /indicated by "Vs" & "Vso"

Response from Previous Owner

My understanding is exactly what you have. Vs is stall clean, and Vso is stall in landing configuration, power off. Approach speed is 1.3 Vso. Rotation speed was 80kts, fly away at no less than 90 knots, with a climb target of 105 with flaps, 120 clean. But that was technique, not really called out anywhere. I do remember that stall speed was about 70, from about 20 deg to full flaps, assuming he had any flaps down, there should have been a good margin of safety.

I set those speeds based on observations and what I felt was safe. I didn't feel the factory speed of 55 was safe, or ever observed in any configuration. The backup analog gauge had the factory recommended 55KIAS shown as the white arc, but if you look at one of the pictures from the google album [See Figure 2] I sent you, on the PFD the white arc started at 70kt.



Figure 1 - PFD/EFIS and Pneumatic ASI Comparison



Figure 2 – PFD/EFIS ASI Bar with White Flap Range

N176PA Express S-90 Checklist		
<u>Pre-Flight Inspection</u>	<u>Before Start</u>	<u>Start (cont'd)</u>
	1. Preflight complete 2. Baggage secured 3. Rear hatch locked 4. Seatbelts check 5. Parking brake set 6. Circuit breakers Check and In 7. Avionics master Off 8. Maps and Docs in reach	10. Oil pressure check 25psi 11. Fuel flow and pressure CHECK 12. Voltage 13.5vdc or higher 13. Avionics master ON 14. Avionics Fan On 15. Flaps set 20 deg for T/O
	<u>Starting Engine</u>	<u>Pre takeoff Check</u>
	1. Master Switch ON 2. Fuel Quantity checked 3. Fuel Selector on Fullest tank 4. Ram air closed 5. Mixture lean 6. Throttle OPEN 1/4" 7. Propeller IN FULL 8. Avionics switch OFF 9. Nav lights ON 10. Strobes ON	1. Nosewheel straight 2. Brakes Set -parking brake and held 3. Doors and Windows Locked and double checked 4. CHT - Oil temp CHECK 5. Trim set for T/O (confirm operation) 6. Flight controls free and correct 7. Fuel quantity check 8. Fuel Selector - Fullest tank 9. Fuel Pump -OFF check pressure 10. Mixture Rich as required 11. Throttle 1700 RPM 12. Engine instruments - Check 13. Suction gauge - Check 14. Ammeter/voltage - Check 15. Magnetos (150RPM drop, max 50RPM difference) 16. Propeller - Cycle 3x 17. Throttle idle <1000 rpm 18. Circuit breakers check 19. Tach selector - switch 20. Flaps set 10 -20deg for T/O
	<u>Start Procedure</u>	
	<u>Cold Start</u> 1. Boost pump on. 2. Check fuel pressure 3. Mixture rich for 5 sec then boost pump off 4. Starter engage <u>Hot Start</u> 1. Mixture lean 2. Boost pump on 3. Throttle open 1/4" 4. Starter engage 5. Upon start mixture rich slowly <u>Flooded Start(HOT)</u> 1. Mixture lean 2. Throttle full open 3. Boost pump on 4. Starter engage 5. Upon engine start, throttle to idle and mixture rich	<u>Takeoff Check</u>
		1. Doors and windows locked and secured 2. Landing lights on with clearance 3. Strobes on 4. Transponder ON/ALT 5. Flaps Set 20 deg 6. Boost pump on 7. Mixture full rich 8. Trim set neutral

Checklist

Cruise

Cruise Climb – 140kts
Prop – 2450 rpm

Approach

Gas – Full Tank
Landing Lights – On
Mixture – Rich
Prop – Full Forward

Approach
110kts clean
90 Kts dirty
85 kts short field

Shut-down & Park

Avionics – Off
All switches - Off
Mixture – Lean
Mags – OFF
Master - Off

Cruise Performance & Power Settings

Airspeed and Engine Limits

Vne -----	220 KIAS
Va -----	130
Vfe -----	123
Vs -----	85
Vso -----	70
Vg -----	90
Vref -----	85
Vx -----	110
Vy -----	120
Vrot -----	80

Oil Pressure
Normal 30-60psi
Min - 10 psi
Max - 100psi

Vacuum - 4.3 -5.9 In. Hg.

Oil Temp
Max 240f
Normal - 160 -210f

CHT
Max 475
Normal 325 -400f
Rec. 150 - 435f

Fuel Pressure
Min - -2.0psi
Max - 35psi

Max TO weight
3300 lbs

Max Landing weight
3200 lbs