

N470LM Engine/Fuel Tests
8/10/17 Air Transport, PHX
Mike Huhn

- Engine attached to airframe, prop attached to engine
 - Reportedly converted Subaru engine
 - 6 cylinders, likely V config
 - Water cooled; 3 separate 'radiators' (converted oil coolers)
 - Prop reduction gearbox, red aluminum
 - Electronically controlled fuel injection - twin fuel rails (1 per cyl bank) and 6 individual injectors
 - No apparent/visible evidence of engine mechanical or thermal distress
- 3-blade prop; all 3 fracture separated 6-12" from spinner OML
- Some wiring and/or wiring harnesses b/t firewall and cockpit not connected
- Left front fuselage crushed near wing leading edge juncture
 - Damage compromised cockpit, including fuel selector valve installation
- Both wings (presumably w fuel tanks) absent
- 3 position fuel selector valve (LEFT, RIGHT, OFF) still plumbed to AC lines
- Throttle/mixture quadrant on left cockpit sidewall
 - Throttle lever mechanically linked to slaved throttle in aft cockpit
 - Both handles/levers traveled full range unrestricted
 - Cable attached to TBD (undetermined by IIC) component in engine compartment
 - 'Mixture' lever not connected to aft cockpit (no provisions) or engine compartment (no provisions)
- Two ship's batteries still installed/attached with some power, but insufficient to crank engine
- Master switch on right lower fwd instrument panel
- Two sets of fuel-related switch panels, one on each side of cockpit
 - "Main Buss" Panel Right Side- Included but not limited to "Main Buss" switch and "Fuel On-Fuel Off" switch
 - Left lower instrument panel – "Main" & "Aux" "Fuel Pump" switches w 2 positions each- "Fuel On" & "Fuel Off"
- "Ignition" switch on "Main Buss" (RH) panel
- Several elements (components and plumbing) of the fuel delivery system fwd of the firewall were not positively identified or fully mapped
 - Overall fuel delivery routing bifurcated (via T fitting) just beyond (downstream of) fuel selector valve to the two (L&R) fuel rails

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TESTS & OBSERVATIONS

- An approx. 2 gallon fuel tank w feed & return lines was plumbed into the ship's Left Tank fuel feed and Left Tank fuel return lines. Cockpit selector set to Left tank
- Accuracy/validity of fuel selector valve positions/plumbing not confirmed
- Supplemental tank filled w fuel
- Switch position and results matrix (ship's power) – see below.
 - o Fwd panel "Master" always ON
 - o Main Buss "Ignition" always ON

		"MAIN BUSS "			
		OFF		ON	
FUEL =>		OFF	ON	OFF	ON
MAIN	OFF	NF	NF	NF	NF
	ON	NF	NF	NF	NF
AUX	OFF	NF	NF	NF	NF
	ON	YF	YF	YF	YF

NF = No fuel flow YF = Yes fuel flow

Flow direction not confirmed in every configuration

- Ship's power insufficient to crank engine; only starter solenoid activation was heard
- External aux electrical power provided to airplane – engine cranked, apparently normally
 - o Master + Main Bus + 3 fuel-related switches to ON for crank/start attempts
 - o Throttle tried in retarded, advanced, & manipulated (moving/cycling) conditions
 - o No indications of ignition
 - o Repeated multiple times with same results
- Spraying of engine starting fluid into air intake resulted in temporary operation of engine; ceased ignition/operation after ~1-3 seconds
 - o Repeated multiple times with same results
- Re-configurations of fuel switches not attempted
- Fuel lines were opened in two separate locations forward of the firewall at two high points in the fuel system (1 each side of airplane/engine) to confirm presence of fuel and bleed any air from system
 - o Fuel presence & pressure/flow was confirmed
 - o Air believed to have been successfully bled (no bleed valves located/observed)
- Additional start attempts yielded same as prior results