CONTINUED AIRWORTHINESS & MAINTENANCE OF LANCAIR AIRCRAFT

Just because it says “experimental” does not mean the maintenance regulations do not apply

Continued Airworthiness & Maintenance

- **Many pilots are under the mistaken impression that the FAR's that apply to normally certificated aircraft do not apply experimental/ amateur built aircraft. This is not true– (with one exception.)**

Continued Airworthiness & Maintenance

14 CFR 91.7: Civil aircraft airworthiness.

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

(b) The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. ***The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.***

There is no exception for experimental aircraft here.

Continued Airworthiness & Maintenance

The FAR's make it pretty clear that the owner is responsible for maintaining the aircraft in an airworthy fashion.

14 CFR 91.403 states: § 91.403 General.

(a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with part 39 of this chapter.

(b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.

Continued Airworthiness & Maintenance

THE EXCEPTION:

14 CFR 43.1: Applicability.

(a) Except as provided in paragraphs (b) and (d) of this section, this part prescribes rules governing the maintenance, preventive maintenance, rebuilding, and alteration of any—

(1) Aircraft having a U.S. airworthiness certificate;

(2) Foreign-registered civil aircraft used in common carriage or carriage of mail under the provisions of Part 121 or 135 of this chapter; and

(3) Airframe, aircraft engines, propellers, appliances, and component parts of such aircraft.

(b) This part does not apply to any aircraft for which the FAA has issued an experimental certificate, unless the FAA has previously issued a different kind of airworthiness certificate for that aircraft.

Continued Airworthiness & Maintenance

- What does this mean? Well for one thing any person may perform maintenance or repairs on an experimental aircraft—they do not need to be an A&P to sign off the work. Records do not have to be kept in the manner prescribed in Part 43 but records do need to be maintained per Part 91.417.

Continued Airworthiness & Maintenance

§ 91.417 Maintenance records.

(a) Except for work performed in accordance with §§91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and ***other required or approved inspections***, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

(i) A description (or reference to data acceptable to the Administrator) of the work performed; and

(ii) The date of completion of the work performed; and

(iii) The signature, and certificate number of the person approving the aircraft for return to service.

Continued Airworthiness & Maintenance

(2) Records containing the following information:

(i) The total time in service of the airframe, each engine, each propeller, and each rotor.

(ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

(iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

(iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

(v) The current status of applicable airworthiness directives (AD) including, for each, the method of compliance, the AD number, and revision date. If the AD involves recurring action, the time and date when the next action is required.

(vi) Copies of the forms prescribed by §43.9(a) of this chapter for each major alteration to the airframe and currently installed engines, rotors, propellers, and appliances.

Continued Airworthiness & Maintenance

(b) The owner or operator shall retain the following records for the periods prescribed:

(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is repeated or superseded by other work or for 1 year after the work is performed.

(2) The records specified in paragraph (a)(2) of this section shall be retained and transferred with the aircraft at the time the aircraft is sold.

(3) A list of defects furnished to a registered owner or operator under §43.11 of this chapter shall be retained until the defects are repaired and the aircraft is approved for return to service.

(c) The owner or operator shall make all maintenance records required to be kept by this section available for inspection by the Administrator or any authorized representative of the National Transportation Safety Board (NTSB). In addition, the owner or operator shall present Form 337 described in paragraph (d) of this section for inspection upon request of any law enforcement officer.

(d) When a fuel tank is installed within the passenger compartment or a baggage compartment pursuant to part 43 of this chapter, a copy of FAA Form 337 shall be kept on board the modified aircraft by the owner or operator.

Continued Airworthiness & Maintenance

- The operating limitations specify the inspection must be conducted in accordance with Appendix D of Part 43. So essentially you must have an “annual” done just like every other aircraft. May you perform your own condition inspection? That depends.

Continued Airworthiness & Maintenance

- As far as the ELT, transponder, altimeter and static system checks, those inspections must be performed as they are on normally certificated aircraft because the regulations that govern them are found in Part 91—not Part 43. Transponders, altimeters and static systems are required to be tested every 24 calendar months. ELTs are required to be inspected every 12 calendar months.

Continued Airworthiness & Maintenance

Some other important items you need to know:

14 CFR 91.319: Aircraft having experimental certificates: Operating limitations.

(a) No person may operate an aircraft that has an experimental certificate—

(1) For other than the purpose for which the certificate was issued; or

(2) Carrying persons or property for compensation or hire.

(b) No person may operate an aircraft that has an experimental certificate outside of an area assigned by the Administrator until it is shown that—

(1) The aircraft is controllable throughout its normal range of speeds and throughout all the maneuvers to be executed; and

(2) The aircraft has no hazardous operating characteristics or design features.

Continued Airworthiness & Maintenance

- (c) Unless otherwise authorized by the Administrator in special operating limitations, no person may operate an aircraft that has an experimental certificate over a densely populated area or in a congested airway. The Administrator may issue special operating limitations for particular aircraft to permit takeoffs and landings to be conducted over a densely populated area or in a congested airway, in accordance with terms and conditions specified in the authorization in the interest of safety in air commerce.
- (d) Each person operating an aircraft that has an experimental certificate shall—
- **(1) Advise each person carried of the experimental nature of the aircraft;**
- (2) Operate under VFR, day only, unless otherwise specifically authorized by the Administrator; and
- (3) Notify the control tower of the experimental nature of the aircraft when operating the aircraft into or out of airports with operating control towers.

Continued Airworthiness & Maintenance

You must display the following placard in a readily visible location in the cabin or cockpit, unless your aircraft has only one seat:

"**Passenger Warning: This aircraft is amateur-built and does not comply with Federal safety regulations for standard aircraft.**"

Continued Airworthiness & Maintenance

- In accordance with § 91.203(b), you must display the airworthiness certificate and attached operating limitations at the cabin or cockpit entrance so that it is legible to passengers or crew while the aircraft is being operated.

Continued Airworthiness & Maintenance

14 CFR 39 Airworthiness Directives:

Must I comply with AD's issued against components on my experimental aircraft?

Yes, there is no provision in 14 CFR 39 that exempts experimental aircraft. AD's are issued for the purpose of safety and AD's that apply to components on your airplane must meet the requirements of the AD. Although the FAA has never issued an AD against experimental aircraft it does routinely have AD's that pertain to engines, propellers, and other aircraft components. Kit builders issue service bulletins and Lancair has a long list of service bulletins that should frequently checked to ensure compliance.

Continued Airworthiness & Maintenance

PHASE I FLIGHT TESTING.

a. Flight Tests. Section 91.319(b) requires you to show your aircraft is controllable at all its normal speeds during all the maneuvers you might expect to execute. You must also show it has no hazardous operating characteristics or design features.

b. Number of Flight Test Hours. The number of hours depends on your aircraft's characteristics. See the following table for specific requirements. The FAA inspector may decide you need additional hours of flight testing beyond those shown in the table to comply with § 91.319(b).

Aircraft Characteristics Required Flight Testing

Type-certificated engine/propeller combination 25 hours

Non-type-certificated engine/propeller combination 40 hours

Continued Airworthiness & Maintenance

e. Restrictions.

(1) **Carrying Passengers.** *You may not carry passengers while you are restricted to the flight test area or during any portion of your Phase I flight test program.* (unless you are operating under the Additional Pilot Program AC 90-116)

(2) Flight Instruction. *You may not receive flight instruction during your flight test.*

Continued Airworthiness & Maintenance

- **(3) Operating Limitations.** When we issue an unlimited duration special airworthiness certificate, the operating limitations may be prescribed under the guidelines in Order 8130.2. The purpose of the operating limitations is for you to show and maintain compliance with § 91.319. The operating limitations include a requirement for you to endorse the aircraft maintenance record (logbook) with a statement certifying the aircraft has been shown to comply with that section.

Continued Airworthiness & Maintenance

BECOMING A REPAIRMAN OF YOUR AMATEUR-BUILT AIRCRAFT. You can get a repairman certificate under certain circumstances. However, the only privilege this certificate gives you under § 65.104 is to do the annual condition inspection. The certificate will be valid only for a specific person and a specific aircraft. Aircraft Builders), for application information. You can get a certificate if you are—

a. The primary builder of your aircraft and can satisfactorily prove to us that you can determine whether the aircraft is in a condition for safe operation.

Continued Airworthiness & Maintenance

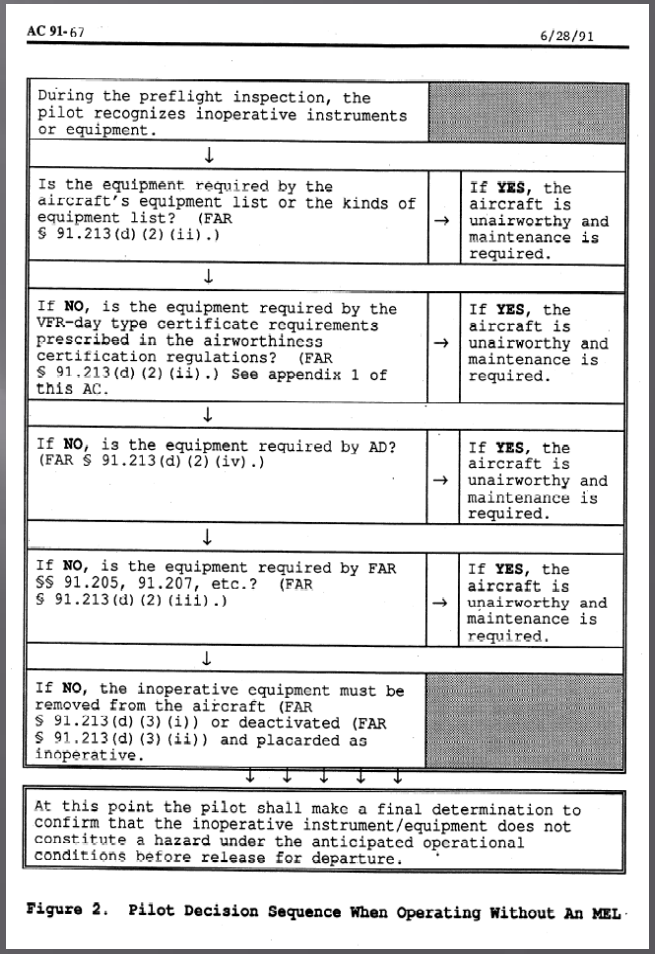
b. Operating Limitations.

(1) The operating limitations require that you operate the aircraft under the applicable air traffic control and general operating rules of part 91. If you plan to operate under instrument flight rules (IFR), pay particular attention to the applicable requirements in part 91.

(2) The operating limitations will authorize all operations to be conducted (visual flight rules, day/night, and IFR). These operating limitations may state that the instruments and equipment mandated by § 91.205(b), (c), and/or (d), Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements, must be installed and operable. In addition, these operating limitations may state flight test areas as defined in § 91.305.

Continued Airworthiness & Maintenance

- If something is broken or inoperative you may fly the aircraft on the condition that the maintenance is properly deferred. Again, no exceptions for experimental. 14 CFR 91.213(d) governs.



AC 91-67 6/28/91

During the preflight inspection, the pilot recognizes inoperative instruments or equipment.

↓

Is the equipment required by the aircraft's equipment list or the kinds of equipment list? (FAR § 91.213(d)(2)(ii).) → If **YES**, the aircraft is unairworthy and maintenance is required.

↓

If **NO**, is the equipment required by the VFR-day type certificate requirements prescribed in the airworthiness certification regulations? (FAR § 91.213(d)(2)(ii).) See appendix 1 of this AC. → If **YES**, the aircraft is unairworthy and maintenance is required.

↓

If **NO**, is the equipment required by AD? (FAR § 91.213(d)(2)(iv).) → If **YES**, the aircraft is unairworthy and maintenance is required.

↓

If **NO**, is the equipment required by FAR §§ 91.205, 91.207, etc.? (FAR § 91.213(d)(2)(iii).) → If **YES**, the aircraft is unairworthy and maintenance is required.

↓

If **NO**, the inoperative equipment must be removed from the aircraft (FAR § 91.213(d)(3)(i)) or deactivated (FAR § 91.213(d)(3)(ii)) and placarded as inoperative.

↓ ↓ ↓ ↓ ↓

At this point the pilot shall make a final determination to confirm that the inoperative instrument/equipment does not constitute a hazard under the anticipated operational conditions before release for departure.

Figure 2. Pilot Decision Sequence When Operating Without An MEL

Continued Airworthiness & Maintenance

- Turbine Powered Airplanes
  - Must have an FAA approved maintenance program
  - Cannot defer maintenance per 14 CFR 213 unless you have an approved MEL. Lancair has written one for the Evo but you must have it approved for your airplane by your local FSDO.

U.S. Department
of Transportation
**Federal Aviation
Administration**

St. Louis Flight Standards District Office
10801 Pear Tree Lane
Suite 200
St. Ann, Missouri 63074

November 30, 2009

William J. Edwards
17704 Greystone Terrace
Chesterfield, MO 63005

Dear Mr. Edwards:

The Federal Aviation Administration (FAA), St. Louis Flight Standards District Office (FSDO), has reviewed your submitted Aircraft Inspection Program for N818SJ, an Edwards Evolution, Serial Number; EVO-011, original issue, dated November 30, 2009, and it is hereby approved.

Any changes or modifications made to this inspection program will require further FAA approval.

If you have any questions or require further assistance, I may be reached at (314) 890-4870.

Sincerely,

Alan D. Hill
Aviation Safety Inspector

CONTINUED AIRWORTHINESS AND MAINTENANCE QUIZ

1. AD's do not apply to experimental aircraft
   - true
   - false

You must have a condition inspection performed on an experimental aircraft in accordance with 14 CFR 43 Appendix D every
   - Every 24 calendar months by an IA
   - Every 12 calendar months by an IA
   - Every 12 calendar months by an IA or a repairman who built the aircraft

You must have what other inspections performed on the aircraft to be legal to fly IFR?

If the aircraft has a cylinder that will not stay below 500F in flight may you fly the aircraft to another facility to be repaired? Explain.

The altimeter does not work properly. Can you operate the aircraft? Explain.

You converted your aircraft to a turbine. Must you make a record entry and do anything else before you carry passengers? Explain.

Boise, Idaho IVPT February 3, 2012 WPR12FA089 Is it Airworthy?

- On the morning of February 3, 2012 a Lancair IVPT crashed on takeoff at the Boise, Idaho airport. The owner/ pilot was killed.
- The pilot aborted his first takeoff attempt after the engine rolled back to idle during the takeoff sequence.
- "A review of the data (see Figures 01 and 02 in the public docket) revealed that after the engine started at 0838:39, the airplane made a continuous taxi (as indicated by variations in groundspeed and heading) from 0844:18 to 0846:07, at which point the nose was aligned with the runway heading (around 100 degrees). From 0846:07 to 0846:32, the airplane remained stationary on the centerline about 270 ft from the approach end of the runway with the torque delivered to the engine shaft (Q) remaining around between 13 to 14 percent, consistent with an idle setting." NTSB

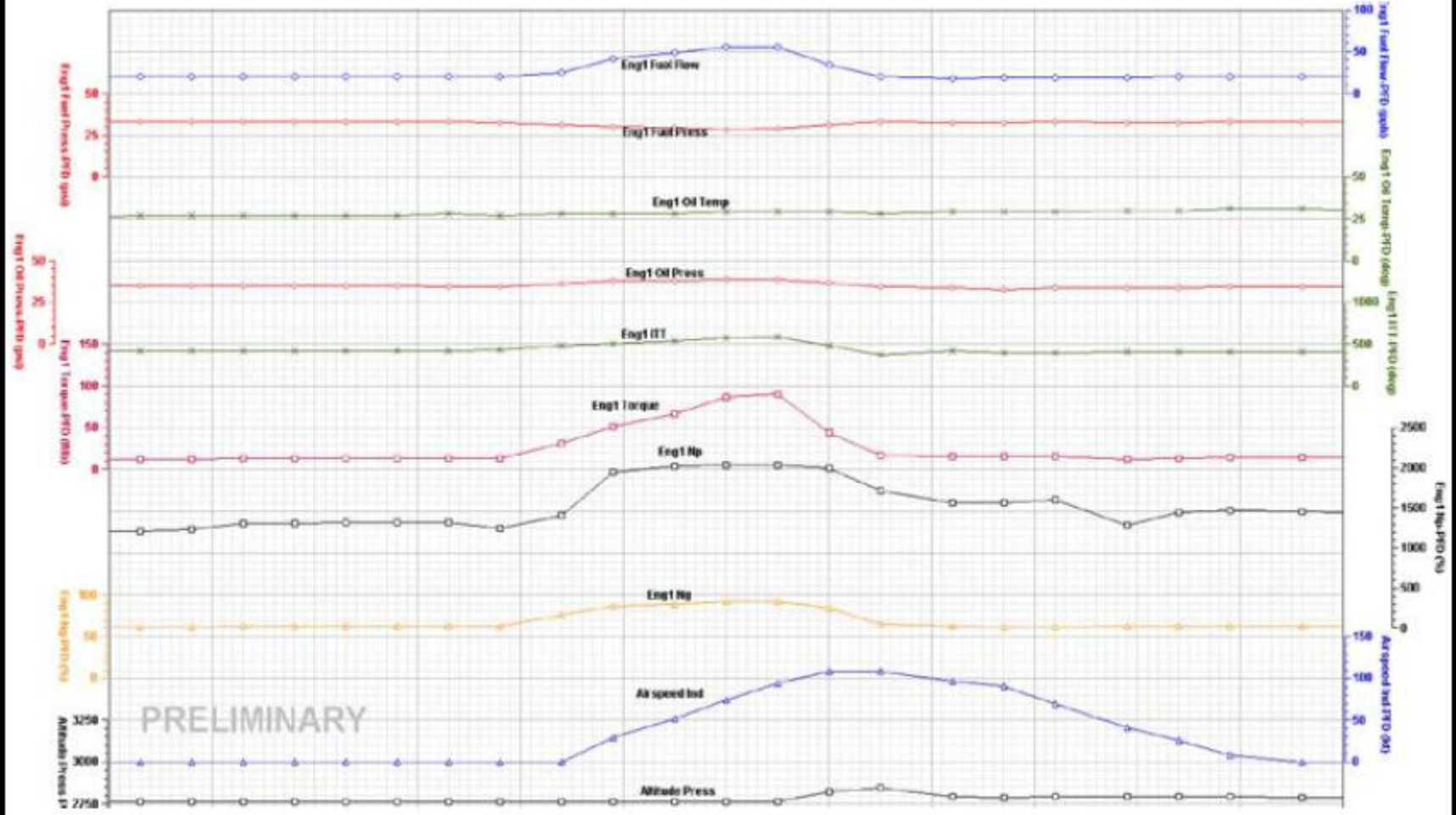
Boise, Idaho IVPT February 3, 2012 WPR12FA089

- “The airplane began the takeoff roll at 0846:32 and became airborne about 0846:59. The airplane climbed 60 ft over the next 10 seconds to 2,845 ft msl, which was the highest attained altitude on that flight and corresponded to about 3,900 ft from the arrival end of the runway, which equates to about 40-percent down the runway with 5,860 ft remaining. At this time, 0847:09, the airplane had reached 108 kts (the highest airspeed of the flight); the pitch attitude had decreased from 8.1 to 4.4 degrees nose-up; the Interstage Turbine Temperature (ITT) had decreased from 581 degrees to 376 degrees Celsius (C); Q had dropped from 89.6 to 13 percent; and fuel flow dropped from 56 to 20 gph. The pilot transmitted that he was going land, and the airplane touched down around 0847:21. The pilot made a right turn to the south to exit onto taxiway D. The airplane continued northwest along taxiway B, made a turn west to taxiway F, north onto taxiway J, and taxied on the ramp toward the pilot's hangar.” NTSB

Boise, Idaho IVPT February 3, 2012 WPR12FA089

- The pilot taxied back to his hangar briefly then taxied back to the runway for another takeoff attempt.
- During the second takeoff the aircraft reached 320 feet AGL when the power again reduced. The pilot attempted to turn back to the runway, lost control and crashed.
- The following slides depict aircraft data and other information obtained form the NTSB Docket Management System.

FIRST TAKEOFF



Time (sec.)	MSL (ft)	AGL (ft)	Airspeed (kts)	Pitch (deg)	Roll (deg)	Heading (deg mag)	Ground Speed (kts)	Fuel Flow (gph)	Fuel Press (psi)	ITT (deg)	Np (rpm)	Ng (% rpm)	Torque (psi)	Oil Press (psi)
8:46:38	ATC: Cleared for departure													
8:46:38	2765	0	0	1.5	0.9	98	8	25.4	31	476	1409	75.2	30.7	36.3
8:46:43	2765	0	29.6	2.1	-0.3	97	23	41.7	30	507	1946	85.8	51.4	38
8:46:49	2765	0	51.4	3.5	-0.8	98	46	48.4	29	540	2023	89.2	67.1	38.1
8:46:54	2765	0	74	4.1	-0.6	97	69	56.2	29	579	2030	92.3	86.6	38.7
8:46:59	2765	0	93.8	8.4	-1.6	99	90	56.3	29	581	2027	92.5	89.6	38.7
8:47:04	2825	47	108	8.1	-2	100	103	34.6	31	479	1991	83.6	44.1	36.8
8:47:09	2845	62.5	108.6	4.4	-3.2	99	104	20.3	33	376	1709	65.5	17.2	34.6
8:47:16	2794	7.4	96	6.8	-1.5	95	96	18	33	415	1571	63.2	16.1	34.1
8:47:18	Pilot: "Going to land here and stop… we got… we got a problem."													
8:47:21	2785	4	90.7	3.3	-0.2	97	89	18.9	33	392	1562	62	15.2	32.9
8:47:26	2795	2	69.9	1.7	0.2	96	68	18.9	33	396	1601	62	16.1	34.1
8:47:33	2795	2	41.6	0.5	0.1	98	40	19.4	33	411	1285	62.8	12.7	34.1
8:47:38	2795	2	25.5	0.6	0.3	106	25	20.1	33	411	1441	62.6	13.8	34.1

Mean Sea Level (MSL)---------Feet
Above Ground Level (feet)----Feet
Airspeed----------Knots
Pitch----------Degrees
Roll----------Degrees
Heading----------Degrees Magnetic
Ground Speed----------Knots

Fuel Flow----------Gallons per Hour
Fuel Pressure----------PSI
Interstage Turbine Temperature-----Degrees
Propeller Rotation Speed (Np)-------RPM
Gas Generator Speed (Ng)---------- % RPM
Torque (Q)----------PSI
Oil Pressure----------PSI

Figure #04: Rejected Takeoff Data 2

GROUND RUN

Time	MSL	AGL	Airspeed	Pitch	Roll	Heading	Ground Speed	Fuel Flow	Fuel Press	ITT	Np	Ng	Torque	Oil Press
8:47:56	2785	0	0	0.1	2.4	237	15	19.8	32.8	411	1443	62.3	14.1	34.5
8:52:25	Pilot taxied back to runway and starts a ground run													
8:52:25	2755	0	0	-0.1	1.9	71.5	0	20.8	32.1	430	1142	63.4	14.4	34.2
8:52:30	2755	0	0	0.1	1.7	59.3	0	21.7	32.5	387	1182	62.1	13	34.1
8:52:36	2755	0	0	-0.5	1.5	60.2	0	29.4	30.4	475	1446	75.9	30.8	35.7
8:52:43	2755	0	0	-0.7	1.4	60.6	0	19.1	32.6	381	1228	62.9	12.2	34.3
8:52:49	2755	0	0	-0.7	1.3	60.9	0	20.2	32.4	434	1130	62.1	12.5	33.9
8:52:55	2755	0	0	-0.6	1.3	60.6	0	20.2	32.4	427	1152	62.1	12.3	31.1
8:53:02	2755	0	0	-0.4	1.3	60.5	0	20.2	32.4	421	547	62	27.7	32.9
8:53:08	2750	0	0	-0.3	1.3	60.5	0	20.1	32.4	422	487	61.8	28.9	34.3
8:53:13	2745	0	0	-0.4	1.2	60.6	0	20.1	32.4	423	553	61.8	25.9	32.8
8:53:19	2755	0	0	-0.5	1.3	60.5	0	20	32.4	425	1046	61.8	13.6	33.8
8:53:26	2755	0	0	-0.5	1.4	60.6	0	20.3	32.4	426	1130	61.8	12.3	33.9
8:53:32	2755	0	0	-0.6	1.3	60.7	0	20.3	32.4	425	1132	61.8	12.2	34
8:53:39	2755	0	0	-0.6	1.2	60.4	0	24.3	31.6	445	1353	70.6	21.2	35.1
8:53:45	2755	0	0	-0.9	1.2	60.4	0	29.7	30.7	475	1614	79	34	36.1
8:53:51	2755	0	0	-0.6	1.3	60.3	0	18.2	32.2	391	1134	61.2	11.5	33.8

Mean Sea Level (MSL)---------Feet
Above Ground Level (feet)----Feet
Airspeed----------Knots
Pitch----------Degrees
Roll----------Degrees
Heading----------Degrees Magnetic
Ground Speed----------Knots

Fuel Flow----------Gallons per Hour
Fuel Pressure----------PSI
Interstage Turbine Temperature----Degrees
Propeller Rotation Speed (Np)------RPM
Gas Generator Speed (Ng)---------% RPM
Torque (Q)----------PSI
Oil Pressure----------PSI

Figure #05: Ground Run

Figure #06: Accident Takeoff

ACCIDENT TAKEOFF

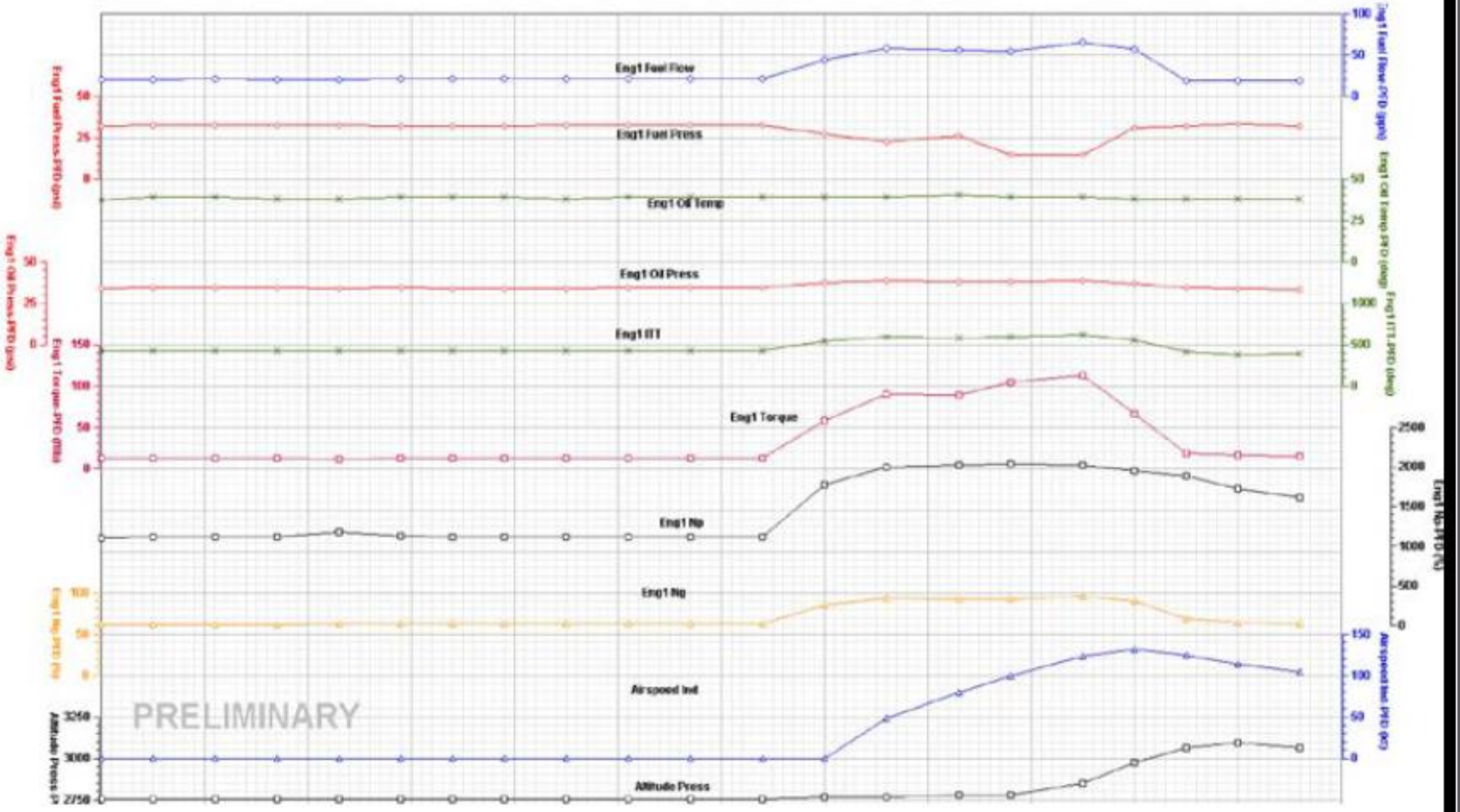


Figure #07: Accident Takeoff Data

ACCIDENT TAKEOFF

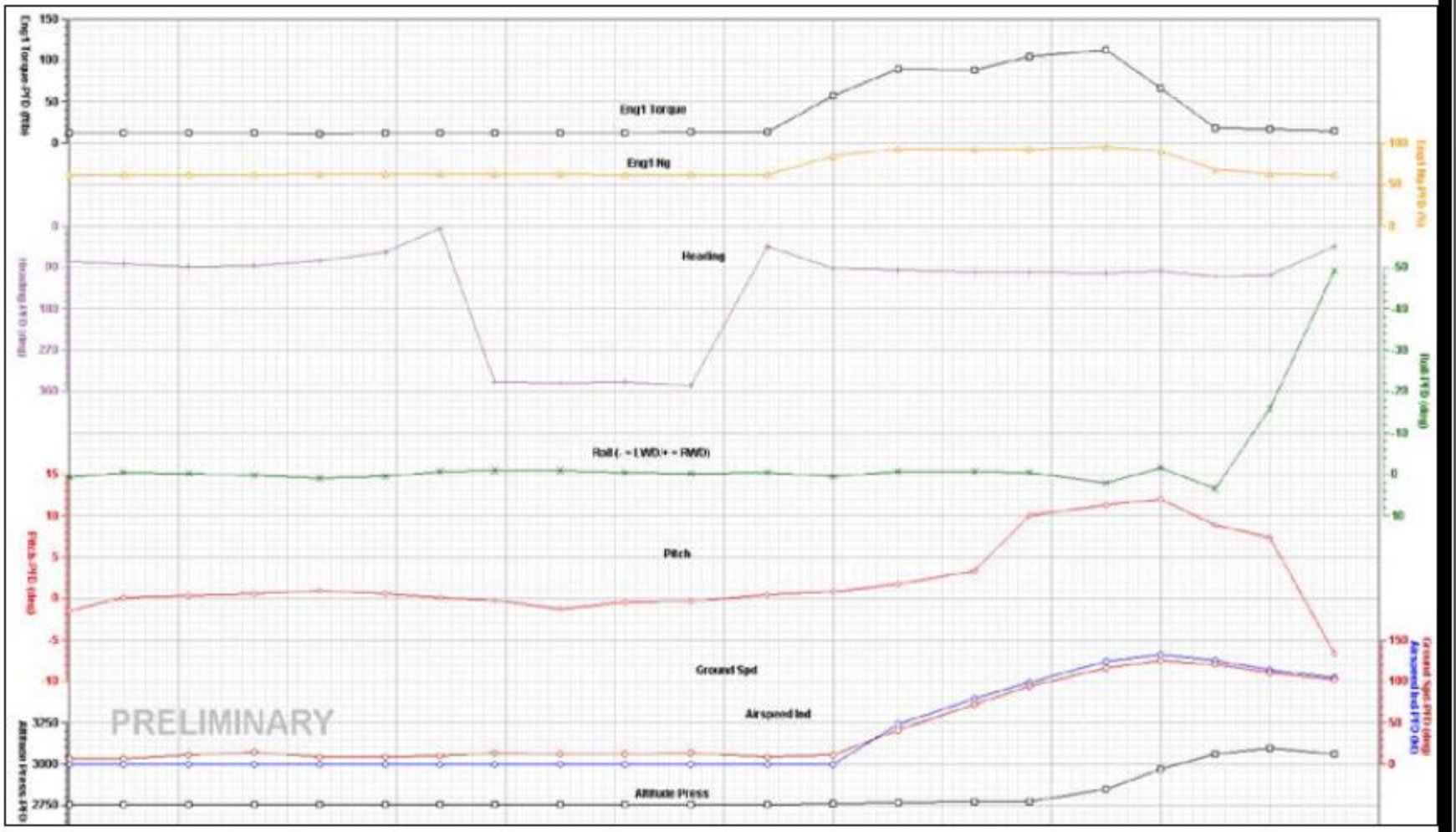


Figure #08: Accident Takeoff Data 2

ACCIDENT TAKEOFF

Time	MSL	AGL	Airspeed	Pitch	Roll	Heading	Ground Speed	Fuel Flow	Fuel Press	ITT	Np	Ng	Torque	Oil Press
8:55:03	ATC: Cleared for departure													
	2765	0	32	1.3	0.8	94	22	61	20	587	1960	93.5	90	38.3
8:55:20	2768	0	49	1.7	-0.7	97	41	57.9	22	585	2002	93	89	38.3
	2775	0	59	2.9	-0.7	98	50	57.4	25	580	1990	92.1	85	38.3
8:55:27	2775	0	79	3.3	-0.7	100	72	55	26	576	2019	92.3	88	38
	2775	0	84	4.1	-0.1	99	76	55.7	26	575	2008	92.3	86	37.9
8:55:30	TSLM Propeller Exceedance (over 2080 rpm)*													
8:55:32	2775	16	99	10	-0.5	102	94	53.8	15	589	2035	92.8	104	37.8
	2787	26	104	10.1	1.2	100	98	64.6	14	611	2015	95.3	111	37.9
8:55:39	2850	87	124	11.3	2	104	116	64.6	14	619	2019	95.3	113	38.5
	2852	87	124	11.1	1.7	104	117	64.6	14	621	2019	95.3	113	38.5
8:55:44	Pilot: "like to turn back in and…uh…land… coming back in…uh…three."													
8:55:44	2972	205	132	12	-1.6	99	126	56.3	31	554	1952	89.9	66	36.8
	2979	210	132	12.2	-1.4	99	126	50.2	31	540	1920	89	59	36.8
8:55:49	3065	294	125	8.9	3.5	109	120	18.6	32	414	1882	68.8	18	34.4
	3072	300	123	8.8	0.7	109	118	18.6	33	409	1904	69.5	18	34.6
8:55:50	TSLM ITT Exceedance (over 735 degrees)*													
8:55:53	Pilot: *Unintelligible transmission*													
8:55:54	3095	321	114	7.4	-16	107	110	18.9	33	379	1721	63.1	16	33.6
	3088	313	112	5.5	-25	92	108	17.9	32	381	1698	62.7	16	33
8:56:00	3065	287	104	-6.7	-49	45	102	18	32	385	1610	62.1	15	32.8
	3052	274	101	-9	-49	21	101	17.6	32	385	1579	61.8	14	32.9

***LIKELY TSLM TIMES**

Mean Sea Level (MSL)---------Feet
Above Ground Level (feet)----Feet
Airspeed----------Knots
Pitch----------Degrees
Roll----------Degrees
Heading----------Degrees Magnetic
Ground Speed----------Knots

Fuel Flow----------Gallons per Hour
Fuel Pressure----------PSI
Interstage Turbine Temperature-----Degrees
Propeller Rotation Speed (Np)-------RPM
Gas Generator Speed (Ng)----------% RPM
Torque (Q)----------PSI
Oil Pressure----------PSI

Figure #09: Accident Takeoff Data 3

TSLM
Turbine Starter Limiting and Monitoring System

-Start sequence controller

•Controls engine start in an automated manner at the press of a button.

-Engine protection limiter

•Recognizes special events such as engine exceeds if and when they occur.
•Controls the start curve via an electric fuel-derich or enrich valve EHT.
•Controls the EHT valve during start operations to limit the ITT and during reverse propeller (beta mode) operation to limit Np.

-Engine monitor/recorder

•Annunciates to the exceedances, start aborts, etc.
•Monitors, records and communicate measured engine parameters to cockpit display
•Records a specific engine's history using detailed time-graphs for all starts and exceedances
•Allows the review of recorded events (engine history) and perform diagnostic trouble-shooting tests.

Figure #10: TSLM Information

TSLM DATA

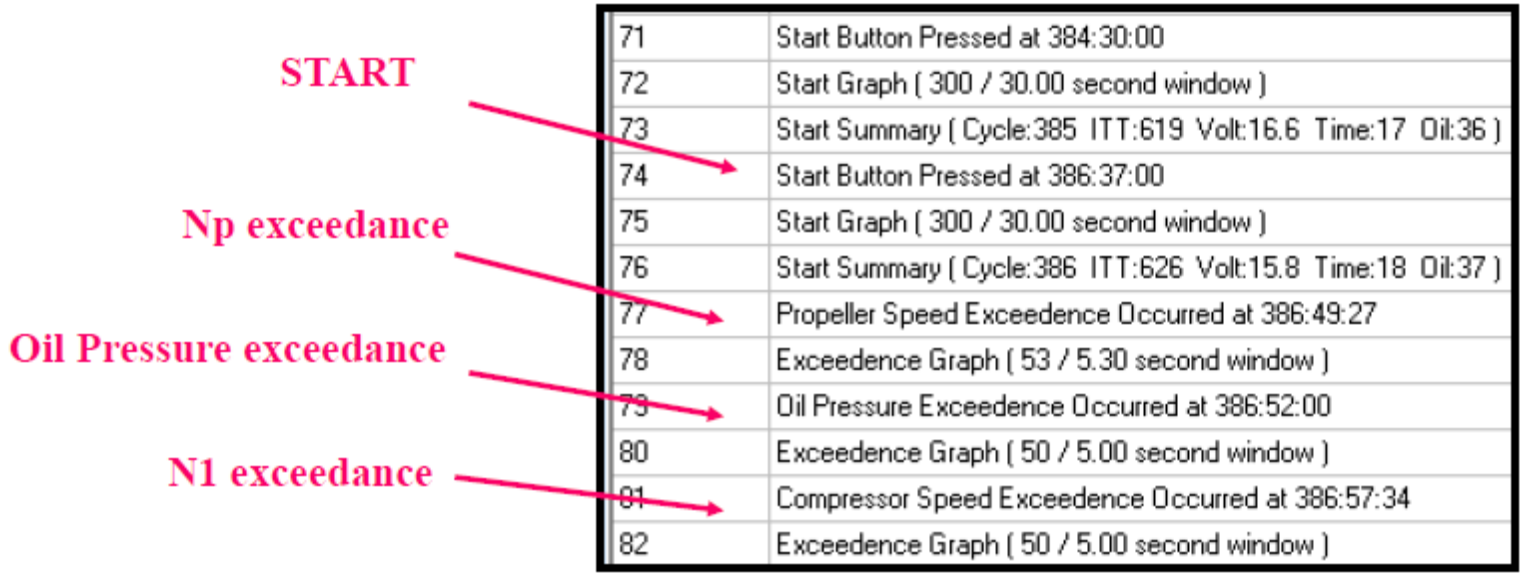
The exceedances were set with the following parameters:
Full limiting ITT= 715 degrees
Beta limiting Np= 1900 rpm
Full limiting compressor rpm (N1)= 101.5
Full limiting Np= 2080 rpm
Full limiting torque = 134 psi
Enable Full (in-flight) limiting= No
Enable beta prop limiting= Yes
Lower ITT= 735 degrees
Upper ITT= 800 degrees

The recorded data showed the following times each of the following exceedances were reached:
ITT reached Max ITT= 32
ITT exceeded 800 degrees= 3
Max N1= 1
Max Np= 58
Max Q = 96

Figure #11: TSLM Parameters

TSLM DATA
FLIGHT PRIOR TO ACCIDENT FLIGHT

-The flight prior had a rejected takeoff similar to accident flight
-Propeller exceedance about 12 mins after start
-Oil pressure exceedance occurred about 15 mins after start
-The only N1 exceedance the engine ever encountered occurred about 20 mins after start



71	Start Button Pressed at 384:30:00
72	Start Graph (300 / 30.00 second window)
73	Start Summary (Cycle:385 ITT:619 Volt:16.6 Time:17 Oil:36)
74	Start Button Pressed at 386:37:00
75	Start Graph (300 / 30.00 second window)
76	Start Summary (Cycle:386 ITT:626 Volt:15.8 Time:18 Oil:37)
77	Propeller Speed Exceedence Occurred at 386:49:27
78	Exceedence Graph (53 / 5.30 second window)
79	Oil Pressure Exceedence Occurred at 386:52:00
80	Exceedence Graph (50 / 5.00 second window)
81	Compressor Speed Exceedence Occurred at 386:57:34
82	Exceedence Graph (50 / 5.00 second window)

Figure #12: TSLM Data Rejected Takeoff

TSLM DATA
ACCIDENT FLIGHT

-Propeller exceedance occurred about 16.5 mins after start
-5 ITT exceedances occurred about 17 mins after start (14 seconds before the pilot tells ATC that he would like to abort the landing.
-2 lower ITT exceedances (produced 2 different graphs)

		START (ITT Rise)	Above 50% N1	Prop Exceedance	ITT Exceedance Lower	ITT Exceedance	ITT Exceedance Lower	ITT Exceedance Upper	ITT Exceedance	END
EFIS	8:38:30	8:38:35	8:38:53	8:55:10	8:55:30	8:55:30	8:55:30	8:55:30	8:55:30	8:56:00
TSLM	387:13:00	387:13:05		387:29:40	387:30:00	387:30:00	387:30:00	387:30:00	387:30:00	
Graph Time (secs)	30			5.5	24.9		22.8			
Time After Start (MM:SS)	00:00	00:05	00:23	16:40	17:00	17:00	17:00	17:00	17:00	

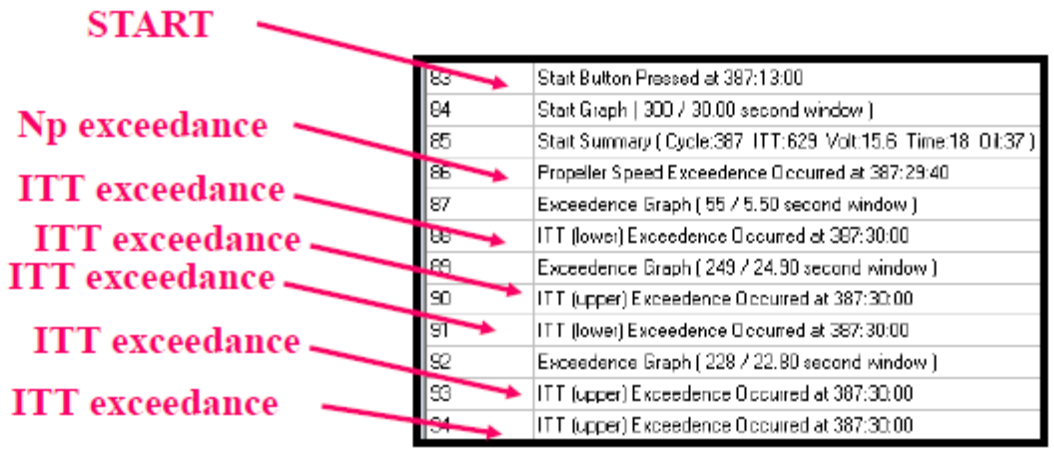


Figure #13: TSLM Data Accident Flight

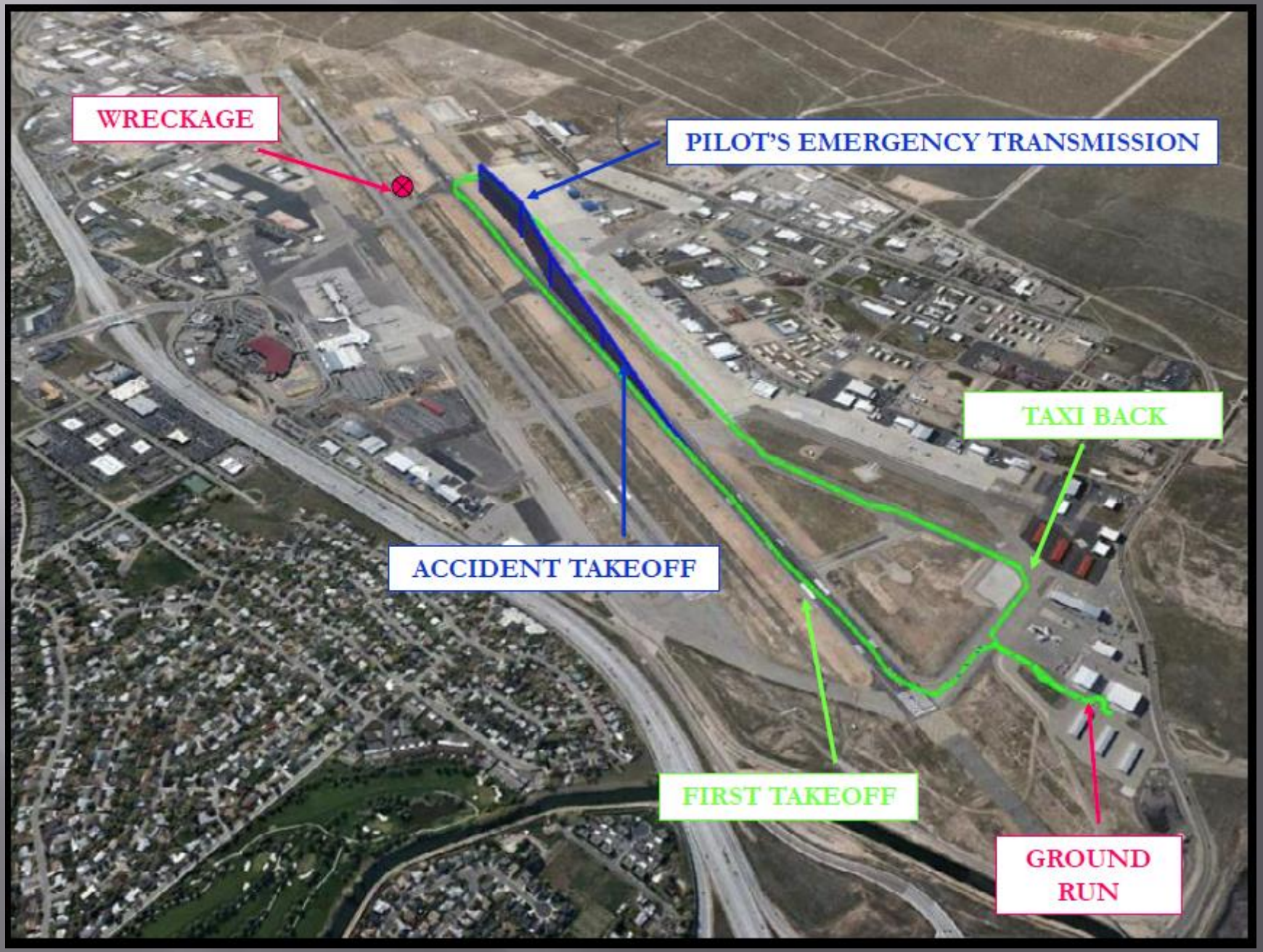
ACCIDENT TAKEOFF

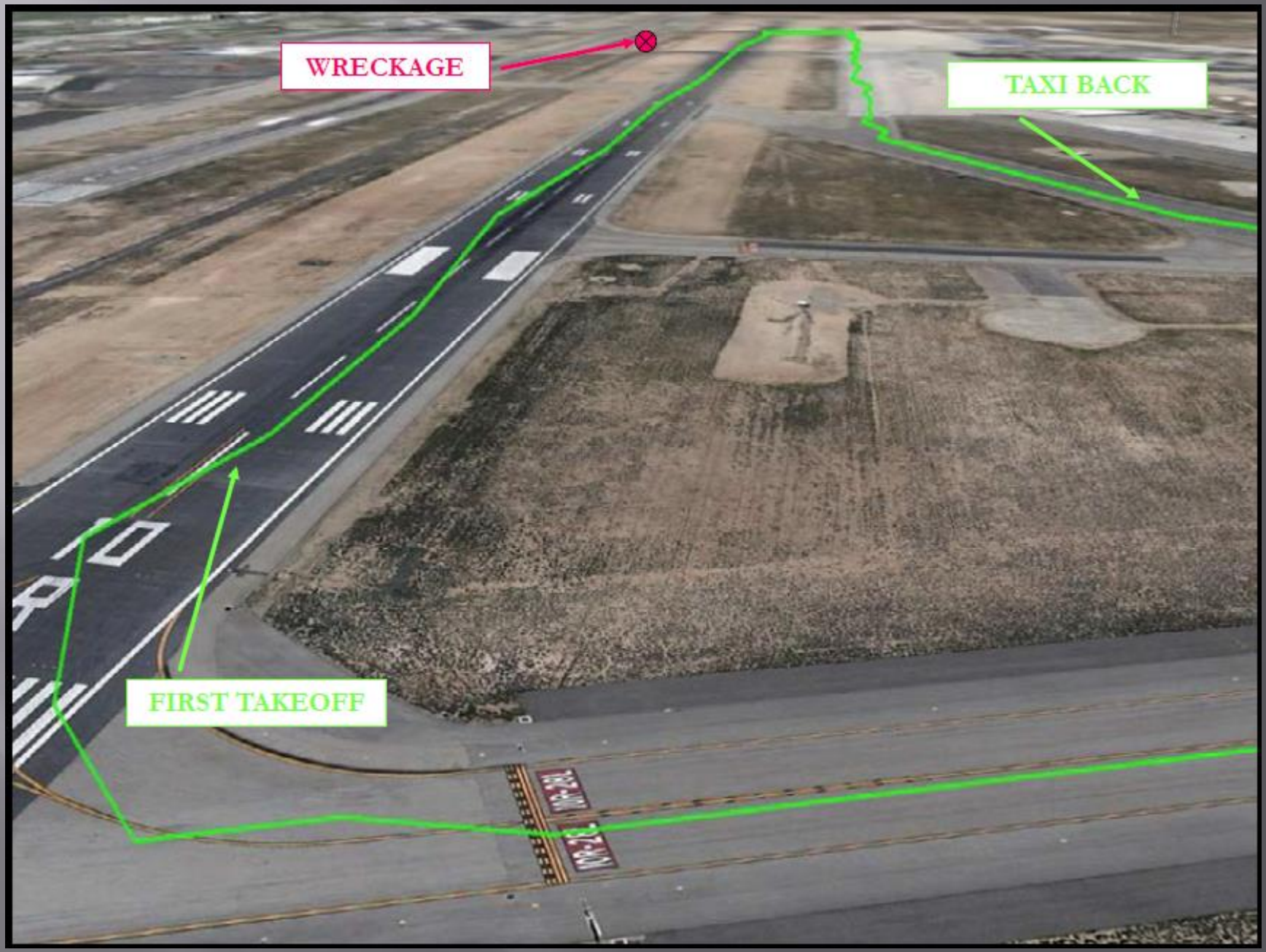
Time	MSL	AGL	Airspeed	Pitch	Roll	Heading	Ground Speed	Fuel Flow	Fuel Press	ITT	Np	Ng	Torque	Oil Press
8:55:03	ATC: Cleared for departure													
8:55:10	TSLM Propeller Exceedance (over 2080 rpm)*													
	2765	0	32	1.3	0.8	94	22	61	20	587	1960	93.5	90	38.3
8:55:20	2768	0	49	1.7	-0.7	97	41	57.9	22	585	2002	93	89	38.3
	2775	0	59	2.9	-0.7	98	50	57.4	25	580	1990	92.1	85	38.3
8:55:27	2775	0	79	3.3	-0.7	100	72	55	26	576	2019	92.3	88	38
	2775	0	84	4.1	-0.1	99	76	55.7	26	575	2008	92.3	86	37.9
8:55:30	TSLM ITT Exceedance (over 735 degrees)*													
8:55:32	2775	16	99	10	-0.5	102	94	53.8	15	589	2035	92.8	104	37.8
	2787	26	104	10.1	1.2	100	98	64.6	14	611	2015	95.3	111	37.9
8:55:39	2850	87	124	11.3	2	104	116	64.6	14	619	2019	95.3	113	38.5
	2852	87	124	11.1	1.7	104	117	64.6	14	621	2019	95.3	113	38.5
8:55:44	Pilot: "like to turn back in and…uh…land… coming back in…uh…three."													
8:55:44	2972	205	132	12	-1.6	99	126	56.3	31	554	1952	89.9	66	36.8
	2979	210	132	12.2	-1.4	99	126	50.2	31	540	1920	89	59	36.8
8:55:49	3065	294	125	8.9	3.5	109	120	18.6	32	414	1882	68.8	18	34.4
	3072	300	123	8.8	0.7	109	118	18.6	33	409	1904	69.5	18	34.6
8:55:53	Pilot: *Unintelligible transmission*													
8:55:54	3095	321	114	7.4	-16	107	110	18.9	33	379	1721	63.1	16	33.6
	3088	313	112	5.5	-25	92	108	17.9	32	381	1698	62.7	16	33
8:56:00	3065	287	104	-6.7	-49	45	102	18	32	385	1610	62.1	15	32.8
	3052	274	101	-9	-49	21	101	17.6	32	385	1579	61.8	14	32.9

***TSLM TIMES RECORDED**

Mean Sea Level (MSL)	Feet	Fuel Flow	Gallons per Hour
Above Ground Level (feet)	Feet	Fuel Pressure	PSI
Airspeed	Knots	Interstage Turbine Temperature	Degrees
Pitch	Degrees	Propeller Rotation Speed (Np)	RPM
Roll	Degrees	Gas Generator Speed (Ng)	% RPM
Heading	Degrees Magnetic	Torque (Q)	PSI
Ground Speed	Knots	Oil Pressure	PSI

Figure #14: Accident Data EFIS


WRECKAGE
PILOT'S EMERGENCY TRANSMISSION
TAXI BACK
ACCIDENT TAKEOFF
FIRST TAKEOFF
GROUND RUN


WRECKAGE
TAXI BACK
FIRST TAKEOFF

Boise, Idaho IVPT February 3, 2012 WPR12FA089

Is it Airworthy? LIVPT Hartsville SC March 8, 2014 3 fatal ERA14FA144

- “According to witnesses, the private pilot had been having problems with the airplane's landing gear system and had been receiving a "Gear Unsafe" indication. Earlier on the day of the accident he was observed working on the airplane and when queried by one of the witnesses, the pilot advised him that he was troubleshooting an electrical problem.” NTSB

Is it Airworthy?
LIVPT Hartsville SC March 8, 2014 3 fatal
ERA14FA144

Is it Airworthy?
LIVPT Hartsville SC March 8, 2014 3 fatal ERA14FA144

- "Examination of the landing gear system revealed that the landing gear handle was in the down position however, the nose landing gear was in the "up" position. The left and right main landing gear were partially extended, and the left main landing gear leg was fractured into two pieces. Examination of the main landing gear doors indicated that the right main landing gear door was closed during the impact sequence and the left main landing gear door was open during the impact sequence. Examination of the hydraulic reservoir revealed it was not full, and only contained about 10 tablespoons of hydraulic fluid. During the examination, no leaks were discovered in the reservoir." NTSB

Is it Airworthy? Hartsville SC March 8, 2014 3 fatal ERA14FA144

- “On September 30, 2004, at approximately 136 total hours of operation, the pilot/owner certified that the airplane had been inspected in accordance with the "N724HP Maintenance Inspection Program annual inspection and found to be in airworthy condition." This was the last entry recorded in the aircraft logbook.
- Approximately 4 weeks later on October 26, 2004, at approximately 146 total hours of operation, the airplane and the pilot/owner were involved in an accident (NTSB Case ID ATL05LA012) at Sylvester Airport (SYV), Sylvester, Georgia. After the accident, the pilot/owner repaired the airplane. This required structural repair work, replacement of the Walter turboprop engine with one that he purchased from Air Lion Inc. with 1,662.3 total hours of operation on it, and repair and replacement of the main landing gear box, main landing gear, and other components. No maintenance logbook entries regarding the repairs to the airplane or the replacement of the engine were discovered during the investigation.
- The pilot/owner's most recent flight review was completed on September 25, 2004.” NTSB

Summary

- Pilot is responsible to operate airworthy aircraft and discontinue flight when an unairworthy condition exists.
- Owner is responsible to maintain aircraft in an airworthy condition.
- The rules regarding maintenance and airworthiness apply to experimental amateur built aircraft!