

## Air Safety Investigations Aircraft Incident/Accident Technical Report

|                                                |                         |                                 |                       |
|------------------------------------------------|-------------------------|---------------------------------|-----------------------|
| Aircraft Incident/<br>Accident Information     | Year: 1976              | Make: Cessna                    | Model: 310R           |
|                                                | Serial number: 310R0506 |                                 | Registration: N87297  |
| Location: Santa Ana, CA                        |                         | Date: 06-30-17                  | Time: 0935 PDT        |
| Aircraft Owner                                 |                         | Aircraft Operator               |                       |
| Twin Props 87297 LLC<br>[REDACTED]             |                         | Francis X. Pisano<br>[REDACTED] |                       |
| Report Information                             |                         |                                 |                       |
| Senior Air Safety Investigator: Andrew L. Hall |                         | Report #: ASI-17-BQ-T           | Report date: 01-11-19 |

### Airframe

#### Impact Sequence and Airframe Structure

Review of the on-site photographs revealed the right wing had been displaced rearward to an approximate 45° angle. The horizontal stabilizer and elevators were separated from the aft fuselage. There was extensive fire damage to the right wing and forward fuselage nose baggage area. The cabin area remained intact with impact damage to the forward window post and thermal damage to the forward left side and overhead areas.

### Airframe Systems

| Flight Control System Information     |                          |                                  |
|---------------------------------------|--------------------------|----------------------------------|
| Control lock: Found loose in aircraft |                          |                                  |
| Flight Control Cable Continuity       |                          |                                  |
| Ailerons: See below                   | Elevators: See below     | Rudder: See below                |
| Aileron tab: See below                | Elevator tab: See below  | Rudder tab: See below            |
| Flap and Trim Positions               |                          |                                  |
| Flap indicator: See below             | Flap handle: See below   | Flap actuator: See below         |
| Elevator trim:                        | Indicator: Takeoff range | Actuator: See below              |
| Rudder trim:                          | Indicator: Neutral       | Actuator: 1.1"                   |
| Aileron trim:                         | Indicator: Full right    | Actuator: Not Reliable see below |

#### Remarks:

The left aileron, trim tab and trim tab actuator was observed in on-site photographs, separated from the wing. The control cables for the trim actuator were separated from the actuator. The actuator trim rod was observed with full extension and considered not reliable. The right aileron remained partly attached to the right wing and was observed in on-site photographs at the main wreckage location. The wings had been removed for retrieval prior to the arrival of this investigator. The aileron cables from the control column to the fuselage aileron bellcrank were attached. The control cables from the rudder pedals aft to the rudder remained attached. The rudder cables were observed attached to the rudder.

bellcrank. The rudder remained attached to the lower and middle attach pivot points and the top half was bent down to the right side. The horizontal stabilizer was observed separated from the fuselage and the trim cables were separated. The elevator trim tab actuator was not measured. The elevator trim actuator hardware attaching the actuator to the trim push/pull tube was observed installed and secured with a cotter pin. The elevator control cables from the cockpit to the aft fuselage elevator bellcrank were attached. The rivets connecting the aft elevator push pull tube connection to the elevator were observed sheared. The center section of the horizontal stabilizer spar remained attached to the fuselage bulkhead and the horizontal stabilizer was separated from the aircraft.

The flap actuator chain was observed with eight links from the terminal end to the center of the drive sprocket, which equated to approximately 15° of flap extension. The flap handle and indicator were observed by the FAA-IIC at the site to be in the flaps 15° position.

| Airframe Fuel System Condition, Controls, and Read Outs |                  |                      |                  |                       |            |
|---------------------------------------------------------|------------------|----------------------|------------------|-----------------------|------------|
| Fuel strainer screen:                                   |                  | Left: See below      |                  | Right: See below      |            |
| Fuel strainer bowl:                                     |                  | Left: See below      |                  | Right: See below      |            |
| Main fuel tank gauge:                                   |                  | Left: 0              |                  | Right: 0              |            |
| Auxiliary fuel gauge:                                   |                  | Left: 0              |                  | Right: 0              |            |
| Locker fuel gauge:                                      |                  | Left: N/A            |                  | Right: N/A            |            |
| Locker transfer:                                        |                  | Left: Not applicable |                  | Right: Not applicable |            |
| Fuel selector handle:                                   | Left: Left       | Fuel selector valve: | Left: Left       | Fuel boost pump:      | Left: On   |
|                                                         | Right: Auxiliary |                      | Right: See below |                       | Right: Low |

#### Remarks:

The left fuel selector handle and valve were observed in the main tank position. The right fuel selector handle was observed by the FAA-IIC at the site in the Auxiliary position. The valve was observed in the wreckage to be pulled past the off-stop position. All fuel caps were accounted for and all filler ports had the nozzle restrictor installed.

Both fuel selector valves were removed from the wreckage and reviewed. The right valve assembly exhibited impact damage and when disassembled the plastic screen was observed melted. The left fuel valve was disassembled and there was a dark residue on the bottom of the filter bowl and no fuel strainer screen was observed.

Both fuel selector valves were x-rayed at Textron Aviation on 11-09-17 and found to have the correct style parts internally installed.

| Landing Gear System Condition and Controls  |                         |                   |                                 |
|---------------------------------------------|-------------------------|-------------------|---------------------------------|
| Gear position:                              | Nose: Extended          | Left: Extended    | Right: Extended                 |
| Actuator position:                          | Nose: Extended          | Left: Extended    | Right: Extended                 |
| Landing gear selector:                      | Extended                |                   | Aux gear control: Out of holder |
| Environmental System Controls and Read Outs |                         |                   |                                 |
| Cabin heater:                               | Off                     | Cabin vent:       | Open                            |
| Air conditioner:                            | N/A                     | Oxygen system:    | Not applicable                  |
|                                             |                         | Oxygen quantity:  |                                 |
| Icing System Information and Switches       |                         |                   |                                 |
| Certified into known icing?                 | No                      |                   | De-ice boots installed?         |
|                                             |                         |                   | No                              |
| Pitot heat:                                 | Off                     |                   | Stall heat:                     |
|                                             |                         |                   | Off                             |
| De-ice:                                     | Surface: Not applicable | Propeller:        | Off                             |
|                                             |                         | Windshield:       | Off                             |
| Anti-ice:                                   | Surface: Not applicable | Propeller:        | Not applicable                  |
|                                             |                         | Windshield:       | Not applicable                  |
| ELT Information                             |                         |                   |                                 |
| Installed?                                  | Yes                     | Manufacturer:     | Narco                           |
|                                             |                         | Model:            | ELT 10                          |
|                                             |                         | Type:             |                                 |
| Serial number:                              | 13959                   | Battery due date: | Nov 18                          |
|                                             |                         | Armed:            | Yes                             |
|                                             |                         | Activated:        | Yes                             |

**Remarks:**

None

**Cabin and Equipment/Furnishings**

| Restraint System Information |          |                |                |              |              |  |
|------------------------------|----------|----------------|----------------|--------------|--------------|--|
| Seat                         | Occupied | Restraint type | Restraint used | Condition    | Manufacturer |  |
| 1                            | Yes      | 3-Point        | Undt           | Worn         | Undetermined |  |
| 2                            | Yes      | 3-Point        | Undt           | Worn         | Undetermined |  |
| 3                            | No       | 2-Point        | No             | Undetermined | Undetermined |  |
| 4                            | No       | 2-Point        | No             | Undetermined | Undetermined |  |
| 5                            | No       | 2-Point        | No             | Undetermined | Undetermined |  |
| 6                            | No       | 2-Point        | No             | Undetermined | Undetermined |  |

| Seat Condition Information |                |             |             |             |             |
|----------------------------|----------------|-------------|-------------|-------------|-------------|
| Seat                       | Orientation    | Feet intact | Back intact | Base intact | Rail intact |
| 1                          | Forward facing | Yes         | Yes         | Yes         | Yes         |
| 2                          | Forward facing | Yes         | Yes         | Yes         | Yes         |
| 3                          | Forward facing | Yes         | Yes         | Yes         | Yes         |
| 4                          | Forward facing | Yes         | Yes         | Yes         | Yes         |
| 5                          | Forward facing | Yes         | Yes         | Yes         | Yes         |
| 6                          | Forward facing | Yes         | Yes         | Yes         | Yes         |

**Remarks:**

Both front seats remained attached to their respective seat base. The aircraft was equipped with shoulder harnesses for the two front seats.

**Instrument Panel**

| Navigation Instruments              |                  |                        |                              |                          |         |                  |                    |
|-------------------------------------|------------------|------------------------|------------------------------|--------------------------|---------|------------------|--------------------|
| Analog primary instruments          |                  |                        |                              | Autopilot type: S-Tec    |         |                  |                    |
| Suction gage: Off scale             |                  | Magnetic compass: Undt |                              | Clock: Undt              |         |                  |                    |
|                                     | Left side        |                        |                              | Left side                |         |                  |                    |
| Airspeed:                           | 0                |                        | Turn coordinator (airplane): | Level                    |         |                  |                    |
| Attitude (pitch):                   | UP 20°           |                        | Turn coordinator (ball):     | Slight right             |         |                  |                    |
| Attitude (roll):                    | Level            |                        | Heading indicator:           | 165°                     |         |                  |                    |
| Altimeter:                          | 400              |                        | Heading "bug":               | 180°                     |         |                  |                    |
| Altimeter setting:                  | 29.95            |                        | Vertical speed indicator:    | 0                        |         |                  |                    |
| Communication and Navigation Radios |                  |                        |                              |                          |         |                  |                    |
| Radio                               | Control          | Active frequency       | Stand-by frequency           | Radio                    | Control | Active frequency | Stand-by frequency |
| Com 1:                              | Undt             |                        |                              | Com 2:                   | Undt    |                  |                    |
| Nav 1:                              | Undt             |                        |                              | Nav 2:                   | Undt    |                  |                    |
| Obs 1:                              | Undt             |                        |                              | Obs 2:                   | Undt    |                  |                    |
| Transponder:                        | Mode: Undt       | Active code:           |                              | Stand-by code:           |         |                  |                    |
| Electrical Switch Positions         |                  |                        |                              |                          |         |                  |                    |
| Master battery: On                  |                  |                        |                              |                          |         |                  |                    |
| Left alternator: On                 |                  |                        |                              | Right alternator: On     |         |                  |                    |
| Avionics 1: On                      |                  |                        |                              |                          |         |                  |                    |
| Lighting Switch Positions           |                  |                        |                              |                          |         |                  |                    |
| Navigation: Off                     |                  | Rotating beacon: Off   |                              | Landing: Off             |         |                  |                    |
| Taxi: On                            |                  | Strobe: Off            |                              | Instrument: Undetermined |         |                  |                    |
| Wing Ice: Not applicable            |                  |                        |                              |                          |         |                  |                    |
| Ignition Switch Positions           |                  |                        |                              |                          |         |                  |                    |
| Left engine:                        | Left magneto: On |                        |                              | Right magneto: On        |         |                  |                    |
| Right engine:                       | Left magneto: On |                        |                              | Right magneto: On        |         |                  |                    |

**Remarks:**

None

## Powerplant Description

| Engine Instruments             |             |              |              |             |              |
|--------------------------------|-------------|--------------|--------------|-------------|--------------|
| Hour meter: 1490.5             |             |              |              |             |              |
|                                | Left engine | Right engine |              | Left engine | Right engine |
| Tach RPM:                      | 0           | 0            | CHT:         | Off scale   | 250+°F       |
| Manifold press:                | 29"         | 30"          | Fuel press:  | Undt        | Undt         |
| Oil press:                     | Off scale   | Off scale    | Fuel flow:   | Undt        | Undt         |
| Oil temp:                      | Off scale   | Green arc    | Ammeter:     | Undt        | Undt         |
| TIT:                           | 0           | 0            | Voltmeter:   | Undt        | Undt         |
| Left Engine Control Positions  |             |              |              |             |              |
|                                | Cockpit     | Engine       |              | Cockpit     | Engine       |
| Throttle:                      | Fwd         | Undt         | Cowl flaps:  | Open        | Undt         |
| Mixture:                       | Rich        | Undt         | Alt air:     | Closed      | Undt         |
| Propeller:                     | High        | Undt         | Primer:      | N/A         |              |
| Right Engine Control Positions |             |              |              |             |              |
|                                | Cockpit     | Engine       |              | Cockpit     | Engine       |
| Throttle:                      | Fwd         | Undt         | Cowl flaps:  | Open        | Undt         |
| Mixture:                       | Rich        | Undt         | Alt air:     | Closed      | Undt         |
| Propeller:                     | High        | Undt         | Primer:      | N/A         |              |
| Engine Condition               |             |              |              |             |              |
|                                | Left engine |              | Right engine |             |              |
| Engine attached to airframe:   | Partially   |              | Partially    |             |              |
| Propeller attached to engine:  | Yes         |              | Yes          |             |              |
| Engine compression:            | Yes         |              | Yes          |             |              |
| Vacuum pump drive shaft:       | See below   |              | See below    |             |              |
| Valve train continuity:        | Yes         |              | Yes          |             |              |
| Engine Fuel System Condition   |             |              |              |             |              |
|                                | Left engine |              | Right engine |             |              |
| Fuel pump drive shaft:         | Intact      |              | Intact       |             |              |
| Fuel injectors:                | Clean       |              | Clean        |             |              |
| Fuel control inlet screen:     | Clean       |              | Debris found |             |              |
| Distribution valve screen:     | Clean       |              | Clean        |             |              |

| Engine Magneto Condition                                           |             |        |        |              |              |        |
|--------------------------------------------------------------------|-------------|--------|--------|--------------|--------------|--------|
|                                                                    | Left engine |        |        | Right engine |              |        |
| Left magneto attached:                                             | Yes         |        |        | No           |              |        |
| Left magneto spark:                                                | See below   |        |        | See below    |              |        |
| Right magneto attached:                                            | Yes         |        |        | Yes          |              |        |
| Right magneto spark:                                               | See below   |        |        | See below    |              |        |
| Left Engine Spark Plug Condition (per Champion Check-A-Plug Card)  |             |        |        |              |              |        |
|                                                                    | 1           | 2      | 3      | 4            | 5            | 6      |
| Top                                                                | Normal      | Normal | Normal | Normal       | Normal       | Normal |
| Bottom                                                             | Normal      | Normal | Normal | Normal       | Normal       | Normal |
| Right Engine Spark Plug Condition (per Champion Check-A-Plug Card) |             |        |        |              |              |        |
|                                                                    | 1           | 2      | 3      | 4            | 5            | 6      |
| Top                                                                | Normal      | Normal | Normal | Normal       | Normal       | Normal |
| Bottom                                                             | Normal      | Normal | Normal | Normal       | Undetermined | Normal |

**Remarks:**

Both engines remained attached to the aircraft through control cables and fluid lines. Neither the left nor the right vacuum pump drives were observed. According to the CMI investigator, there was nothing observed with either engine which would precluded them from producing power.

The left engine magnetos were tested at the CMI facility in Mobile, AL on 07-10-17. The magnetos, in the as received condition, did not produce a spark. During the examination, the condensers were replaced and the points were cleaned of soot on both of the left engine magnetos, both produced sparks on all leads.

The right engine magnetos were tested at the CMI facility in Mobile, AL on 07-10-17. The magnetos, in the as received condition, produced sparks on all leads.

**Propellers**

According to, Textron Aviation-McCauley Propeller Engineering:

Both propellers had impact damage. There were no indications of any type of propeller failure or malfunction prior to impact

Both the LH and RH propellers had indications consistent with a low amount of rotational energy absorption (rotation at impact likely with low engine power) during the impact sequence. Exact engine power levels were not determined.

There were no impact signature markings or component positions indicating blades at feather position at impact. Both propellers had several indications of operating on or near the low pitch stop position at impact. The concluded propeller blade angles are consistent with indicated power levels.

## Research & Testing

The JPI indicator was reviewed by the NTSB and data downloaded. These plots show Fuel Flow and each cylinder Exhaust Gas Temperature (EGT). The first plot is the left engine entire flight and the second is the left engine takeoff. The third and fourth charts are for the right engine. Note only the full flight legends were correctly annotated.



