NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

January 25, 2008

Group Chairman's Factual Report - Maintenance Organization and Processes

A. ACCIDENT

Location:	Sanford, Florida
Date:	July 10, 2007
Time:	0835 Eastern Daylight Time (EDT)
Airplane:	Cessna 310R, N501N
NTSB Number:	NYC07MA162

B. GROUP

Chairman:	Michael Huhn Air Safety Investigator National Transportation Safety Board
Member:	Robert Potts Aviation Safety Inspector Federal Aviation Administration

C. SUMMARY

On July 10, 2007, about 0835 eastern daylight time[1], a Cessna 310R, N501N, was destroyed during a collision with trees and residential homes while performing an emergency diversion to the Sanford Orlando International Airport (SFB), Sanford, Florida. The certificated airline transport pilot and the commercial pilot were fatally injured. Three persons on the ground were fatally injured, and four were seriously injured. A post crash fire consumed the airplane and two single-family homes. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the personal flight that was conducted under 14 CFR Part 91. The airplane departed Daytona Beach International Airport (DAB), Daytona Beach, Florida about 0822 and was destined for Lakeland Linder Airport (LAL), Lakeland, Florida.

[1] All times in this report are eastern daylight time based on a 24-hour clock

Diversion Details

Shortly after reaching a cruising altitude of 6,000 feet, the flight crew declared an emergency to air traffic control (ATC). The crew advised that there was "smoke in the cockpit," and announced their intention to land at SFB. ATC cleared the airplane to fly directly to SFB and descend to 2,000 feet. Radar data indicated that the accident airplane turned toward SFB and commenced its descent. ATC then cleared the accident crewmembers to "to land any runway." The last radio transmission from the airplane occurred about 0833. It was terminated in mid-sentence and appeared to include the phrase "shutoff all radios, elec." The last radar return from the accident airplane was about 0835, approximately 1/2-mile east of the accident site.

D. DETAILS OF INVESTIGATION

1.0 NASCAR Fleet

1.1 General

As of July 2007, NASCAR operated a fleet of nine airplanes. The fleet was composed of two Hawker 800XP, one Hawker 400XP, one Gulfstream 450, one Falcon 50, one King Air 350, one Citation 3, one Lear 31A, and the accident airplane. These airplanes were based at three separate locations; DAB, Concord Regional Airport (JQF), Concord, North Carolina, and Charlotte/Douglas International Airport (CLT), Charlotte, North Carolina. Some of these airplanes were permanently stationed at these bases, while others rotated between the bases in response to operational needs. Total fleet utilization was approximately 2,500 to 3,000 flight hours per year. Like the accident flight, all NASCAR operations were conducted under 14CFR Part 91.

1.2 Accident Airplane

NASCAR purchased the accident airplane in March 1995, and domiciled it at the DAB facility. The accident airplane was the only piston powered airplane operated by NASCAR, and unlike the rest of the fleet, it was not typically used for executive transport. The airplane was used primarily to transport parts, goods and documents for NASCAR. During the months preceding the accident, there was only one company pilot[2] who was assigned to operate the airplane for those trips. In addition to the business flights, the airplane was also used occasionally by the accident pilot[3] for personal flights. It was the operator's policy that whenever the commercial pilot flew the airplane, he was to be accompanied by the individual who was also on board the airplane at the time of the accident, and who was also another NASCAR pilot. This individual[4] was different from the company pilot who normally operated the accident airplane for the business trips.

[2] This pilot is subsequently referred to as 'the company pilot' in this report
[3] The accident pilot is subsequently referred to as 'the commercial pilot' in this report
[4] This Air Transport rated pilot is subsequently referred to as 'the ATP' in this report

In the six years prior to the accident, airplane utilization averaged approximately 130 hours per year, and at the time of the accident, its total time in service was approximately 4,770 hours.

2.0 Facilities, Organization and Responsibilities

2.1 General

The corporate offices for the Aviation Division of NASCAR were located at DAB. Of the two "satellite bases" at JQF and CLT, only JQF was considered a maintenance facility. However, NASCAR did employ one full time airframe and powerplant-rated technician at CLT. At DAB, NASCAR occupied two hangars and adjoining office facilities. One hangar was used primarily as an airplane shelter, and the other was used primarily for maintenance activities. The NASCAR Aviation Division offices were located in a building adjoining the maintenance hangar. These offices included the NASCAR aviation director, the chief pilot, and the director of maintenance (DoM). Although all three offices were in the same building, the DoM office was physically located on the opposite side of the hangar from the offices of the chief pilot and the aviation director.

2.2 Standard Administration & Operations Manual

The operator provided the Safety Board with a hardcopy of the current NASCAR Aircraft Operations Standard Administration & Operations Manual. This document was informally referred to by several NASCAR aviation department personnel as 'the SOP.' This document consisted of 13 chapters[5] spanning approximately 130 pages. Each chapter was dedicated to a specific functional area or topic, and each chapter contained the NASCAR corporate policy and procedural guidance pertaining to that topic.

The foreword by the NASCAR Chairman noted that NASCAR operated its own airplanes "as a management tool to improve the efficiency" of its personnel. The SOP did not contain any specific reference to the purpose or applicability of the SOP, but the foreword closed with the statement that the NASCAR Chairman "will insist on adherence" to the procedures in the SOP.

The SOP contained a control page, a revision log page, and a list of effective pages. The revision log page was dated "30 SEP 04." With the exception of six pages, all pages listed in the 'List of Effective Pages' were dated "20 OCT 02." One page in the 'Corporate Aviation Policy' was dated "25 APR 04". One page in the 'Organization, Duties and Responsibilities' chapter was dated "30 AUG 04." Three pages in the 'Introduction' and one in the 'Operating Specifications' chapter were dated "30 SEP 04."

According to the aviation director, the original NASCAR aviation department SOP was created in-house and was "small." As the organization expanded, the SOP was outsourced to a private vendor, who developed a template. This template was then edited by the aviation director and the ATP to create the current document.

[5] See Figure 1 for the SOP chapter listing

The three chapters of the SOP that were primarily referenced for this factual report were Chapter 4 (Organization, Duties and Responsibilities), Chapter 7 (Standard Operating Procedures), and Chapter 10 (Maintenance). Chapter 7 consisted of information for flight crew personnel, and specifically concerned the conduct of flight operations. Guidance in the other chapters was not restricted to any particular personnel group.

Although it does not directly apply to the NASCAR aviation operation, FAA Advisory Circular ('AC') 120-71A ' Standard Operating Procedures for Flight Deck Crewmembers,' provides some guidance on SOPs. According to this AC, "Standard operating procedures (SOPs) are universally recognized as basic to safe aviation operations." The AC further states that "SOPs should be clear, comprehensive, and readily available" and that the "mission of SOPs" is "To achieve consistently safe flight operations..." Finally, the AC states that:

> In general, effective SOPs are the product of healthy collaboration among managers and flight operations people, including flightcrews. A safety culture promoting continuous feedback from flightcrews and others, and continuous revision by the collaborators distinguishes effective SOPs…

2.3 Aviation Director

The aviation director was employed by NASCAR for over 22 years, and served in his current position for approximately 13 years. The aviation director reported directly to the president of NASCAR. Both the director of maintenance (DoM) and the chief pilot reported to the aviation director.

Chapter 4, paragraph 4.2.1 ('Director of Aviation') of the SOP required that the aviation director "establish and monitor a maintenance, inspection and repair program to ensure aircraft are maintained in an airworthy condition." Chapter 10, paragraph 10.1.0 ('Responsibility For Airworthiness') of the SOP stated that the aviation director has the "primary responsibility for the airworthiness of all aircraft owned or operated" by NASCAR.

2.4 Director of Maintenance

The DoM was employed in that position since February 1998. Per Chapter 10 of the SOP, the DoM was "responsible to ensure that all aircraft within his/her area are maintained in an airworthy condition at all times."

Chapter 4, paragraph 4.2.5 ('Director of Maintenance') of the SOP enumerated approximately twenty specific tasks or activities that were the responsibility of the DoM. These covered a variety of subjects, including supervision of the maintenance technicians, compliance with regulations and manufacturer's guidance, and the overall operation of the maintenance facility. Some specific responsibilities included:

- Ensure that all maintenance and inspection activities conform to the highest professional standards of the air transportation industry
- [Decide] the airworthiness of all aircraft and their return to service

- [Coordinate] aircraft availability with flight operations and return of aircraft to flight status following inspections and maintenance

In addition, Chapter 10, paragraph 10.2.0 ('The Director of Maintenance Responsibilities') of the SOP specifically cited that the DoM was responsible to:

- Establish, implement and review a system to ensure that any changes in the operational readiness or status of aircraft equipment is provided to flight crews and dispatch in a complete and timely manner
- Establish and maintain records as required by the…Aviation Department to support the maintenance program
- Supervise the activities of all assigned maintenance personnel
- [Work] with the Manager and/or Chief Pilot for planning and coordinating scheduled inspections, repairs and other maintenance functions to ensure that a timely and orderly flow of aircraft are available

2.5 Chief Pilot

The chief pilot was employed in that position since August 2004. Chapter 4, paragraph 4.2.2 ('Chief Pilot') of the SOP enumerated the responsibilities of the chief pilot. Most items were concerned directly with the operation of the airplanes and the flight department. This paragraph stated that the chief pilot was responsible to "Ensure that [NASCAR] aircraft are operated safely." The SOP did not specify any reciprocal responsibility for the chief pilot to coordinate with the DoM regarding the timing of maintenance activities to ensure sufficient availability of airplanes.

2.6 Maintenance Technicians

Per Chapter 4, paragraph 4.2.6 ('Maintenance Technicians') of the SOP, maintenance technicians' responsibilities included the following:

- Maintaining or altering, or performing preventative maintenance…in strict adherence to manufacturer's recommendations and Federal Aviation Regulations parts 43, 145
- Launch and receive all flights originating from Aircraft Operations
- Perform flight inspections on company aircraft

Chapter 10, Paragraph 10.3.0 ('Maintenance Technician and Pilot Responsibilities') of the SOP specified that the maintenance technicians "shall complete a pre-flight inspection of the aircraft prior to first flight of the day at the home station."

The DAB facility had seven full time maintenance technicians. These maintenance technicians reported directly to the DoM. All seven were certificated mechanics with airframe and powerplant ratings, and two held inspection authorizations. The three DAB technicians with the longest tenure had 14, 13 and 11 years, respectively. The normal working hours for the technicians at DAB were Monday to Friday, from 0700 to 1600. Each week, one or more technicians would be available on an as-needed basis to arrive for work 2 to 3 hours early in order to support airplane 'launches.' This duty was performed on an alternating basis, and was

referred to by maintenance personnel as an 'early week.' Weekend duty was performed on a rotating basis, with each technician typically working approximately every fifth weekend.

In a post-accident interview with Safety Board personnel, the DoM noted that the administrative processes for maintenance activities were not documented, and that they were not available to technicians, except in verbal format. According to the DoM, new maintenance technicians "learn as they go" from other technicians.

Many aircraft maintenance organizations utilize a 'crew chief' system, whereby a specific individual is formally assigned, on a long-term basis, as the sole individual who is ultimately responsible for a specific airplane. The NASCAR Maintenance Department did not employ such a system. Instead, NASCAR assigned a specific technician who was primarily, but not solely or ultimately, responsible for each airplane. The technician who 'launched' the accident airplane the morning of the accident flight was the primary technician for that airplane.

2.7 Flight Manager

Two organization charts, one from page 4-1 of the SOP (Fig 2) and one provided loose (Fig 3) by NASCAR aviation personnel, depicted positions of "Flight Administrative Manager" and "Flight Coordinator." However, SOP paragraphs 4.2.8 and 4.2.9 described the duties of the "Senior Flight Coordinator" and the "Flight Coordinator", respectively. There was no SOP paragraph for "Flight Administrative Manager." The SOP included the following two duties for both the Senior Flight Coordinator and the Flight Coordinator:

- Maintains (sic) a working knowledge of all changes and deviations from planned flight schedule
- Advise other appropriate departments of an anticipated pilot or airplane limitation that may cause schedule interruptions

3.0 MAINTENANCE SCHEDULING

3.1 General

According to Safety Board interviews with the subject personnel, planned and unplanned maintenance activities were finalized using a combination of verbal and email coordination between the DoM, the flight administrative manager, the chief pilot, and the aviation director. Once finalized, this information was typically incorporated into the various schedule programs and depictions, again via verbal and/or email coordination. Each day's maintenance activities were communicated to the technicians via daily morning briefings from the DoM. According to one technician, the DoM used the "yellow sheets"[6] to assist him in determining the tasks for the day.

[6] The yellow copies of the Maintenance Discrepancy Reporting form. See Section 6 of this report for a full discussion.

The flight administrative manager used and maintained a computerized airplane schedule. This schedule depicted flight and maintenance activity, but did not reflect the airworthiness status of any airplane. The flight administrative manager's normal working hours were from 0900 to 1700, Monday through Friday.

In response to a Safety Board request, the aviation director provided printouts of spreadsheets of 'Airplane Weekly Flight Schedules' for the past 30 days for the entire NASCAR fleet, including the accident airplane. These schedules were provided in two sets; one for the accident airplane, and one for the reminder of the fleet. The aviation director stated that this was because these spreadsheets were maintained as two separate electronic files.

3.2 SOP Guidance

As noted previously, Chapter 4, paragraph 4.2.5 stated that the DoM has the "Responsibility for deciding [an airplane's] return to service."

The final subparagraph of Chapter 10, paragraph 10.7.0 ('Maintenance Control Procedures') stated that the DoM was responsible to provide the Director of Aviation with "Aircraft maintenance schedules, projecting at least twelve months." The first subparagraph of paragraph 10.14.0 ('Maintenance Scheduling') stated "All aircraft maintenance will be scheduled on or before it is due", and that any deviations from this must be approved either by the "Aviation Department" or the "Manager, Aviation Maintenance." The only other subparagraph stated that "Routine maintenance inspections should be scheduled to minimize any impact on trip schedules" and that "Close coordination with local Management, Schedulers and Operations Assistant is essential." Chapter 10 did not contain any specific information regarding the methods, procedures or tools that were to be used for scheduling airplane maintenance.

3.3 Director of Maintenance (DoM) Roles and Responsibilities

According to the DoM, he was the individual who was ultimately responsible for scheduling airplane maintenance, but this was accomplished in coordination with the flight administrative manager and the chief pilot. These three individuals met every Monday to review the flight and maintenance schedules for all the airplanes. Whenever the DoM was not available at DAB due to business travel or personal leave, his maintenance scheduling responsibilities and other duties were delegated to the assistant DoM. In the event that both the DoM and the assistant DoM were not available at DAB, these responsibilities were explicitly delegated to a specific maintenance technician.

The DoM used a computer program called 'AVTRAK' to track scheduled maintenance requirements on all the NASCAR airplanes except the accident airplane. Not all NASCAR technicians had access to the AVTRAK program and information. A separate computer program (referred to as 'EDD') was used to track the accident airplane's time- or hours-driven maintenance requirements. This program resided solely on the DoM's computer. No other individuals were able to access this information, even when the DoM was on a planned absence. Technicians working on the accident airplane were required to contact DoM for EDD-contained information.

During the Safety Board interview of the DoM on July 16, 2007, six erasable marking boards ('white boards') were observed on the wall of the DoM's office. Each white board was dedicated to two months of the calendar year. These boards were used for schedule planning purposes. They listed the planned maintenance activity and general status for each airplane. However, they did not, nor were they intended to, indicate the airworthiness status of any airplane. The availability and schedules of the maintenance technicians were also indicated on these white boards. According to an FAA Inspector, these boards were not mounted on the DoM's office wall on the day after the accident.

4.0 AIRPLANE RELEASE AND FLIGHT READINESS STATUS

4.1 SOP Guidance

As noted previously, Chapter 4 Paragraph 4.2.5 stated that the DoM has the "Responsibility for deciding the airworthiness of all aircraft."

Chapter 7 was concerned with flight operations and intended for use primarily by flight crew personnel. Among other items, paragraph 7.3.0 ('Flight Preparation') requires that "all flight crewmembers must be familiar with" the "maintenance status" of the airplane.

Chapter 10, paragraph 10.4.0 ('Aircraft Status and Maintenance Procedures') did not contain any explicit guidance regarding aircraft flight readiness or airworthiness status. Paragraph 10.7.0 ('Maintenance Control Procedures') required that records "shall be made of all maintenance performed on aircraft." It then stated that these records "shall be preserved in an easily retrievable manner to provide the following data to Aviation operations management, Director of Maintenance and flight crews"; one of the "following data" items was "current aircraft condition."

4.2 DoM Recount

According to the DoM, his involvement in aircraft trip scheduling was limited to recommending which specific airplanes should be used or avoided, depending on utilization rates and upcoming maintenance needs. He said that approximately 90 percent of the flights were planned trips. There was no dedicated dispatching system, and the electronic schedule maintained by the flight administrative manager was intended to be the formal and ultimate source of information regarding whether any given NASCAR airplane was available for a trip. However, this schedule did not explicitly reflect the airworthiness status of any of the airplanes in the fleet. Changes to this schedule due to airworthiness issues required verbal coordination between the maintenance department and the flight administrative manager; there was no unilateral or systematic means for a pilot or maintenance technician (including the DoM) to remove an airplane from the flight schedule. Finally, according to the DoM, no single person had the final authority to release an

airplane for flight; it was a collaborative effort involving the aviation director, the chief pilot and the DoM.

4.2 Company Cessna 310 Pilot Recount

During his Safety Board interview, the company Cessna 310 pilot noted that there was no status board for the Cessna 310 or any other airplane. He did not have access to the maintenance logs, so it was sometimes difficult for him to determine the flight status of the airplane. This was exacerbated further by the fact that, unlike the rest of the fleet, the accident airplane did not have an MEL.

4.3 Cessna 310 Primary Technician Recount

The primary technician on the Cessna 310 said that pilots of company airplanes inbound to DAB would often radio the maintenance department to report airplane discrepancies before they landed. When this occurred, the technicians had to confer with the DoM to determine whether the flight administrative manager had to be advised that the airplane was to be removed from the flight schedule after landing. With regard to making a determination whether an airplane should be removed from the schedule, the technician noted that the pilot "doesn't have a lot to say about the airplane or the write up," and that the decision to remove the airplane was made by the DoM. If the decision was made to disallow the airplane to fly, that information was relayed to the flight administrative manager so that she could reschedule pilots and passengers onto other airplanes. The technician noted that once an airplane was repaired, he advised the DoM of that fact, and the DoM then relayed that information to the flight administrative manager, and the airplane was re-integrated into the operating schedule.

4.4 Aviation Director Recount

According to the aviation director, if the DoM believed that an airplane should not be permitted to fly, the DoM would confer with the aviation director, and called him at home if necessary. The director noted that any pilot who planned to operate an airplane was responsible for reviewing the discrepancy forms[7] in the book in the airplane, and deciding whether he should take that airplane. The aviation director said that he has previously gotten involved in the decision to remove an airplane from the flight schedule, but that "when the pilot in command gets on board, he [the pilot] makes the call. But we are all involved in the decision." The director stated that once a discrepancy was corrected by maintenance, there should be a notation to that effect on the sheet in the airplane, but that "in the heat of battle, sometimes we don't do that."

[7] See Section 6 of this report for a discussion of these forms

5.0 AIRPLANE PRE- AND POST- FLIGHT PROCEDURES

5.1 SOP Guidance

Chapter 7, paragraph 7.3.0 ('Flight Preparation') specified "all flight crewmembers must be familiar with" the "maintenance status of aircraft." Paragraph 7.6.0 ('Aircraft Preflight Inspection') specified that the "Pilot-in-Command or Copilot will conduct an exterior preflight of the aircraft." It also stated "when departing from the company facility, a NASCAR, Inc mechanic will also complete a preflight inspection. The mechanic's preflight does not relieve the flight crew from their preflight responsibility." Paragraph 7.39.0 ('After Landing') specified that the "Pilot-in-Command shall complete aircraft log books [and] write-up discrepancies."

Chapter 10, Paragraph 10.3.0 ('Maintenance Technician and Pilot Responsibilities') specified that the technicians "shall complete a pre-flight inspection of the aircraft prior to first flight of the day at the home station," and that the flight crew "shall also complete a pre-flight inspection." The same paragraph further stated that the "pre-flight completed by the maintenance tech does not relieve the Pilot-in-Command from pre-flight responsibility."

5.2 DoM Recount

According to the DoM, a system of airplane-specific forms were used by the technicians to assist them and the pilots with the pre- and post flight inspections. (Refer to Figure 4 for a copy of the Cessna 310 sheet). These "Pre-Flight / Post Flight Inspection" sheets were filled out and initialed by a technician for each pre-flight, and were then taped to the outside of the airplane near the entrance door. The DoM noted that these sheets were primarily a pre-flight application, despite their formal printed title. They were essentially pre-flight checklists intended to "streamline" the process, and to "serve as a double check" on the aircraft condition and readiness for flight. The DoM noted that although pilots did not fill out these forms, they may refer to them during their pre-flight, and they were still responsible to conduct own pre-flight. Once a technician completed a pre-flight inspection and was satisfied with the condition of the airplane, the sheet was removed from the airplane and discarded. There were no specific requirements regarding the timing of when the sheet was to be taped to the airplane, or when it was to be removed. The DoM noted that sometimes the sheets were removed after an airplane was pushed out of the hangar, but before the pilot(s) arrived.

5.3 Aviation Director Recount

The aviation director's description of the use of these sheets was similar to that provided by the DoM. The aviation director stated that these were not "a must-have item" for the pilots taking the airplane, but that "maybe [they] should be, but no, you could go to maintenance and get a verbal" preflight inspection approval from the technician(s). He also stated that he did not believe that the SOP contained any information regarding theses sheets or their use.

5.4 Company Cessna 310 Pilot Recount

The pilot who flew the accident airplane the day prior to the accident noted that he "didn't have a maintenance [pre-flight] sheet on the airplane that day but that's not unusual." He said that some technicians completed their pre-flight, marked the sheet with "G2G," and left it taped to the airplane. 'G2G' was the technicians' shorthand for 'good to go,' indicating to the pilot that maintenance had completed its pre-flight and that the airplane condition was acceptable. He noted that the sheets were not always on the airplanes when the pilots arrived, but if they were, and were complete, the pilots removed and discarded them.

6.0 MAINTENANCE DISCREPANCY REPORTING SYSTEM

6.1 SOP Guidance

The operator used a combination of written and verbal methods to report airplane discrepancies. Chapter 7, paragraph 7.41.0 ('Post-Flight Reports') contained the following guidance:

- The Pilot-in-Command shall note in the discrepancy section of the pre/postflight form all mechanical irregularities encountered during flight…. On return to the home station, the Pilot-in-Command shall brief maintenance personnel on the nature of the irregularities.
- These reports will be completed at the end of the day and will contain a concise account of the irregularities that have occurred and indicate any corrective action taken.

Chapter 10, paragraph 10.4.0 ('Aircraft Status and Maintenance Procedures') stated that the DoM "shall establish and maintain a system…for the purpose of correcting deficiencies and improving overall maintenance effectiveness." The following excerpts from paragraph 10.8.0 ('Aircraft and Equipment Discrepancies') provided more explicit guidance on this topic:

- All aircraft and equipment malfunctions shall be recorded in the aircraft Pre-Flight and/or MEL Discrepancy form in the aircraft logbook. Each discrepancy shall be described in sufficient detail to provide maintenance personnel with the information necessary to identify and correct the problem, Flight crews should contact maintenance personnel to ensure that a complete and accurate description of the discrepancy is provided.
- Discrepancies and inoperative equipment not corrected immediately must be corrected within the guidelines of the MEL and/or appropriate Federal Aviation Regulations.
- If a defect or malfunction is found effects of safety and flight (sic), FAA Malfunction or Defect Report (FAA Form 8010-4) will be submitted within seventy-two hours of the discovery. A copy of the report will be kept in file (sic) in the office of the Director of Maintenance.

6.2 Chief Pilot Recount

According to the chief pilot, airplane discrepancies were initially reported by flight crews using unnumbered 'No Carbon Required' (NCR) discrepancy reporting forms (Fig 5) kept on each airplane. The same forms were common to all airplanes in the fleet. The chief pilot did not specify how long these forms had been in use at NASCAR. The chief pilot explained the workings of the NCR discrepancy form as follows:

- Each form consists of a top (white) copy and a bottom (yellow) copy. Anything written on the top copy will appear on the bottom copy until the forms are separated.
- On the top copy of the un-separated form, the pilot enters an airplane or equipment discrepancy in the left column ('Maintenance Write Up'), and also enters his initials and the date.
- The pilot then separates the two copies of the form
- The pilot submits the yellow copy to the DoM by placing it in either one of two boxes. One box is located in the Operations area of the offices, and the other box is located in the DoM's office in the hangar.
- The white copy with the listed discrepancy remains in the airplane, stored for access by pilots and technicians in a small binder.

According to the chief pilot, the yellow copy is "given to maintenance" by the DoM so that the Maintenance department can "work the discrepancies." He then stated that once the discrepancy is satisfactorily addressed, the following actions occur:

- The mechanic enters the corrective action in the right hand columns ('Maintenance-Clearing Action') on *both* the white and yellow forms.
- If the corrective action is a closing action, the mechanic removes the white form from the airplane.
- If the corrective action is not a closing action (e.g. if a 'loaner' piece of equipment was installed that would require subsequent removal) the white copy remains with the airplane until a subsequent closing action is accomplished.
- The chief pilot did not specify the final disposition of either the white or yellow copies.

6.3 Director of Maintenance (DoM) Recount

The DoM also provided information about the discrepancy reporting system, and it contained both similarities with, and differences from, the description provided by the chief pilot. The DoM stated that the maintenance department referred to these forms as "discrepancy forms", and that their purpose was to serve as a backup method of keeping the DoM advised of airplane discrepancies. He stated that the primary means of reporting airplane discrepancies was verbal, and that flight crews "will let you know" if there was a problem with an airplane following a flight.

The DoM stated that when a flight crew wrote up a discrepancy, the white copy remained in the airplane, and the pilot placed the yellow copy in a box on the DoM's door. The DoM had no formal system for reviewing or filing these yellow forms. He retained them for approximately six months, where they were clipped together in stacks by airplane registration number, and kept in a box behind his desk. This duration was of a variable length, and was as short as a few weeks or as long as six months. Ultimately, all yellow copies were discarded.

According to the DoM, once a technician completed a corrective action for a discrepancy, the technician entered the corrective action only on the white copy. The technician initialed and dated the form, but left it in the book in the airplane. As part of their preflight preparations, maintenance technicians and pilots were expected to review the white discrepancy forms in the book. When a pilot flew an airplane with a white form that had been signed off by maintenance, and the pilot agreed that the discrepancy had been rectified, the pilot drew a diagonal line across the form, and initialed the line (Fig 6). This indicated to the technicians that the white copies could be removed from the book. There were no other specific requirements or timelines for the removal of these completed forms. Once the completed white copies were removed from the airplane, they were discarded. At no point in the process were any corrective actions entered on the yellow copies.

When the DoM was asked about the disposition of the yellow copies after the work was assigned to the maintenance department, he indicated that these copies were placed in the box behind his desk and "thrown away" after a short but unspecified period of time. When asked about the disposition of the white copies once a closing maintenance action was accomplished, the DoM stated that they were "kept" for three to six months. He did not explicitly state how or where these were retained.

An inspection by investigators of the yellow copies in the box in the DoM's office on July 12, 2007, did not reveal any for the accident airplane. None of these yellow copies in the box contained any corrective actions.

The DoM stated that he is often away from the DAB facility on business for one or two weeks at a time. The DoM also noted that it is his understanding that the aviation director requires the pilots to telephone the aviation director after every flight, in order to provide a synopsis of the flight, including any airplane discrepancies.

According to an FAA inspector, in response to a post accident request for any completed white copies of the NCR forms for the accident airplane, the DoM provided eight separate documents. When the DoM was asked by the FAA inspector whether these eight documents were the only white copies for the accident airplane that were in his possession, he said yes, but added that "there was one other for the radar." When asked where the copy regarding the July 9 radar problem was, the DoM said "we can't find it."

6.4 Cessna 310 Primary Technician Recount

According to the technician with primary responsibility for the accident airplane, corrective actions for the discrepancies are signed off only on the white copies, and are not ever entered on the yellow copies. Once the white copies have been signed off, they eventually get discarded. When asked by Safety Board investigators how he would research past discrepancies on an airplane, he responded that he would look at the yellow copies in the DoM's office. When asked to describe how these yellow copies were archived, he responded that he did not know how the DoM organized them.

6.5 Company Cessna 310 Pilot Recount

The Cessna 310 pilot said that he always wrote up discrepancies with the airplane, regardless of whether he verbally informed anyone else or not. He wrote these discrepancies up on the forms in the previously mentioned book, left the white copy in the book, and left the book open on the airplane throttle quadrant. He either placed the yellow copy in the box on the DoM's door, or handed it directly to the DoM.

7.0 Airplane Maintenance Records

7.1 SOP Guidance

Chapter 10, paragraph 10.7.0 (Maintenance Control Procedures) required that records "shall be made of all maintenance performed on aircraft…in accordance with appropriate Federal Aviation Regulations." It then stated that these records "shall be preserved in an easily retrievable manner to provide the following data to Aviation operations management, Director of Maintenance and flight crews." The "following data" items included "current aircraft condition" and "maintenance history."

7.2 DoM Recount

According to the DoM, the logbooks for airplanes based at DAB were retained in the DoM's office at DAB. The accident airplane was based at DAB, and the logbooks for this airplane were kept at DAB. For any airplane based at DAB, once a maintenance task was completed, the technician came into the DoM's office and made the appropriate entry in the appropriate airplane logbook. The DoM stated that he used the pilot's discrepancy write-up as his guide to determine whether a logbook entry was required.

7.3 Chief Pilot Recount

According to the chief pilot, when maintenance that required a logbook entry was conducted on an airplane at a location that was not the same as where the airplane logbooks were located, the maintenance facility would provide the crew with a logbook entry on an adhesive-backed form that could be inserted into the logbook upon their return to the airplane's home base. The DoM was responsible to review all logbook entries before an airplane was returned to service, and was responsible for ensuring placement of the maintenance entry into the logbook.

8.0 N501N Events of July 9, 2007

8.1 Company Cessna 310 Pilot Recount

The company Cessna 310 pilot stated that the typical procedure was for pilots to call the office each day in the mid to late afternoon in order to obtain their flight assignments for the following day. Neither this pilot nor the Cessna 310 was originally scheduled to fly on July 9. The pilot said that he received a phone call early that day informing him of a "pop up" trip to JQF (Concord, NC) in order to retrieve another individual's passport. He filed the flight plan and then telephoned in a fuel request. He calculated the airplane weight and balance at home, and then left for DAB. When he arrived at DAB, the airplane was already fueled, and all four tanks were full. The pilot noted that even though the technicians normally have the pre-flight form taped to the side of the airplane, the pilots conduct their own preflight inspections. He said there is also a "trip sheet" confirming that there were no passengers on this flight. He conducted his preflight inspection. He said that there were some "open minor squawks," which are airplane discrepancies that had not been addressed by maintenance personnel. He did not remember specifically what these were, but did recall something regarding an interference problem between the extra hand-held microphone and an airplane trim control.

The pilot said that he had a "perfect" flight to JQF, with no airplane or weather concerns. The outbound trip to JQF took two hours. He radioed ahead to ensure that a fuel truck would be standing by for his arrival. He said that the fueler "did a great job," enabling a "quick turn" of the airplane. He conducted a "walk-around" (pre-flight) inspection, and departed for DAB.

He climbed to 10,000 feet, and had the auto-pilot and weather radar on. The radar was "picking up the coastline," but it was not depicting the precipitation that the pilot could see out the windows. Approximately one hour into the flight, the radar screen "went blank," so he shut it off, and was planning to immediately turn it back on. However, before he could turn the radar back on, he noticed a smell that reminded him "of a burnt amplifier," but he did not see any smoke. He said it "took me a good minute to find the damned circuit breaker," and then he "pulled it." He noted that the radar circuit breaker was located on the bottom row of the circuit breaker panel that is on the left cabin sidewall near his left leg, and that this was the first time he had ever experienced radar problems with that airplane.

The pilot was uncertain if it was his "turning off the radar or pulling the circuit breaker, but the odor went away." He said "the smell was strong enough where I would have diverted if it had continued. Believe me, I was on red alert." The smell and/or fumes were not irritating, and they "didn't last very long."

The pilot wrote this event up in the airplane discrepancy book (Fig 7) during the return flight. He flew for approximately 1 hour and 20 minutes after shutting down the radar, and the radar remained off for the duration of this flight. He did not experience any additional symptoms. He landed at DAB at 1610, and the technicians were still present at the facility. A technician who was not the primary technician for the accident airplane marshaled the airplane into a parking spot, and the pilot told him exactly what had happened with the radar. The pilot asked whether the DoM was still available, and was told that he was. The airplane was towed into the hangar

with the pilot still sitting in the seat. The pilot then exited the airplane and handed the yellow copy of the radar write-up directly to the DoM. The pilot then went back to the airplane, "cleaned it up," and put in the control wheel lock. He said that due to the time, all the technicians were leaving for the day. He did not know that the airplane was scheduled for a flight the following morning, July 10.

The pilot was shown the copy of a radar problem write-up that was recovered from the airplane accident site. He confirmed that this was his discrepancy write-up that he had made on July 9 and that he had left in the airplane discrepancy book. In response to a question from Safety Board investigators, he replied "If I saw that write up, no I would not fly the airplane." He added, "I would get clarification. I'm upset that [the ATP on the accident flight] didn't call me." In addition, the pilot stated that the ATP "would have checked the logbook no matter what. It wouldn't have mattered who he was flying with," and reiterated that the ATP "never called me to ask about my write up."

8.2 Cessna 310 Primary Technician Recount

The technician stated that he "met the airplane around 4pm," and asked the pilot if there were any problems with the aircraft. The technician said that the pilot told him that "the radar has a problem, it isn't working," and that the pilot had pulled the circuit breaker. The technician said that the pilot did not communicate anything about "odor, smoke, or anything."

The technician moved the airplane into the hangar with the assistance of two other technicians and in the presence of the DoM. Around this time, the technician was told that there was a flight at 0800 the next day (July 10), and was aware that it would be the other pilot who would be taking the airplane. The technician decided to service the airplane the following morning (July 10), since it was already the end of the current workday.

8.3 Director of Maintenance Recount

July 9th was the DoM's first day back at work after a two-week absence for vacation. He was walking across the hangar when the airplane was being towed into the hangar. The DoM said that after he saw the airplane being towed into the hangar, he was in the chief pilot's office, and the company Cessna 310 pilot walked in and informed them about the radar problem. The DoM said that the pilot's recount of the event was that the radar display "flashed", and then went blank. He said that the pilot told him that the pilot smelled something, pulled the radar circuit breaker, and continued uneventfully to DAB.

The DoM said that when the chief pilot asked if the airplane could be flown on July 10, the three of them collectively made the decision. He said "the group agreed it was good to go." The DoM added that the flight administrative manager might have also been present at this time, but that he could not recall that with certainty. He then said that chief pilot and the pilot discussed who should call the ATP who was scheduled to take the airplane the next morning, in order to inform him of the radar discrepancy. The DoM believed that they agreed that the chief pilot would make the telephone call.

The DoM did not recall seeing the yellow discrepancy form regarding the radar write-up, and he did not have this document in his office. The DoM did not know whether the chief pilot ever saw the yellow copy of the write-up for this event.

8.4 Aviation Director Recount

In his post-accident interview, the aviation director said that he had heard that the commercial pilot "was going to take a trip down south" in the airplane, and that the aviation director was normally informed about these flight activities by the flight administrative manager. The aviation director said that he did not know about any problems with the airplane.

8.5 Chief Pilot Recount

The chief pilot said that he was in his office with the company Cessna 310 pilot after the radar event flight. The chief pilot said that the DoM came into his office, and then the company Cessna 310 pilot began briefing the DoM about the radar event, but that the chief pilot did not hear the conversation because his attention was distracted by another issue. The chief pilot recalled that the DoM said "it will be OK, just tell [the ATP] not to turn it [the weather radar] on".

On the evening of July 9, the chief pilot spoke with the ATP about the Cessna 310. The chief pilot told him that maintenance needed to look at the airplane. The chief pilot told investigators that he provided the ATP with the following details:

- The weather radar was not "painting" (depicting) obvious weather
- About one hour into the flight, the pilot detected an odor which he thought was a "burning" smell
- The pilot turned the radar off, and located and pulled the circuit breaker
- The smell disappeared after the circuit breaker was pulled
- The flight continued uneventfully for the remaining 1 1/2 hours to landing at DAB
- The pilot had verbally informed maintenance of his radar write-up

The chief pilot said that he telephoned the ATP because that pilot was a personal friend, and that "all activities connected with the 310" and the commercial pilot involved the ATP. The chief pilot noted that he did not telephone the commercial pilot that evening.

In a written statement provided to the Safety Board shortly after the accident, the chief pilot noted that the DoM was aware of the July 9 radar problem, and that the radar had "been acting up lately." The chief pilot also noted that the DoM "indicated that they were taking care of the radar, it would be OK, just tell [the ATP] not to turn on the radar." Finally, regarding the chief pilot's telephone call to the ATP, the ATP reportedly responded "No problem, we don't need the radar for an early flight to Lakeland."

9.0 N501N Events of July 10, 2007

9.1 Cessna 310 Primary Technician Recount

On the day of the accident, the primary technician arrived at 0600 in order to support the 0800 departure of the accident airplane. He was responsible for the two launches that morning. There was one other technician also working at that time. The primary technician said that he believed this was a pleasure flight, and that for the past six weeks, the two pilots had been using the airplane regularly.

At about 0645 the technician received a telephone call from the ATP instructing him to "top off" the airplane. The technician informed the pilot about the radar problem, saying, "We have a discrepancy with the airplane." The technician said that the pilot replied, "I know about the radar, I know about the circuit breaker, I don't give a [expletive deleted] about that, I'm taking the airplane."

The technician said that the DoM told him that the radar "went out". The technician said that he personally did not know about any odor or smoke. He said that he did not look for the discrepancy book, never went inside the airplane, and that he did not see the radar system write up. He did not "collar"[8] the radar circuit breaker, and he did not prepare or use a preflight sheet for the airplane that morning. The technician had known the ATP for several years, and stated that the ATP conducted the pre flight inspection, and was "very picky about that stuff."

When the technician was shown the white copy of the radar write-up and asked what he would have done had he seen it, he responded that he would not have released the airplane, and would have directly informed the ATP that he could not take the airplane. When the technician was asked whether the ATP knew about the severity of the write up, the technician responded adamantly in the negative.

9.2 Director of Maintenance Recount

The DoM arrived at the facility about 0700 on July 10. He knew the accident airplane was scheduled for departure at 0800. The DoM said that the accident flight was a "pop up" flight, meaning it had not been scheduled very far in advance. He said that the Cessna 310 primary technician was the one assigned to do the maintenance preflight on the airplane that morning. The DoM said that he had no knowledge of the preflight activities of the two pilots taking the airplane on July 10, 2007

The DoM did not personally inspect the airplane or review its discrepancy forms between the July 9 return and the July 10 accident flight. Aside from the brief meeting just subsequent to the July 9 return, the DoM said he did not speak with the company Cessna 310 pilot until July 13, 2007.

[8] A term denoting a means of deactivating a circuit by pulling a circuit breaker and installing a temporary device that prevents the circuit breaker from being pushed back in.

When he was shown the white copy of the radar write up and asked whether he would release the airplane for flight, the DoM replied that he would not do so.

9.3 Aviation Director Recount

The morning of the accident, due to a prior engagement, the aviation director did not arrive at his office until after the accident. As noted above, he had no knowledge of the radar problem or write-up. When he was shown the white copy of the radar write up and asked for his thoughts, he said that he "would question the write up", meaning he would seek additional information about the event. He said that it was significant enough to warrant further investigation, but he also questioned how significant it would have appeared to a pilot who did not have the hindsight benefit of knowledge of the accident, particularly for the conduct of a flight that would not require use of the weather radar.

9.4 Chief Pilot Recount

The chief pilot arrived at his office at 0825, after the airplane had already departed. He said that the day was scheduled to be a 'light day for flying," meaning only a few airplanes were scheduled to depart or arrive. He elaborated that there were only two airplanes scheduled out for that day, and that three or more launches would not be considered a light day by him.

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Figure 1 – NASCAR SOP Table of Contents

CHAPTER 4
ORGANIZATION, DUTIES AND RESPONSIBILITIES

4.1.0 ORGANIZATION DUTIES AND RESPONSIBILITIES

NASCAR Aviation Department (**NAD**) is a division of the National Association For Stock Car Auto Racing, Inc., (NASCAR), Incorporated and existing under the laws of the State of Florida, and having its principal place of business in Daytona Beach, FL. **NAD**'s primary business purpose is to operate and maintain company owned aircraft for the purpose of providing air transportation within the corporate structure or as approved and sanctioned by NASCAR management. **NAD**'s hangar facilities are located at Daytona Beach International Airport, at 485 Coral Sea Avenue, Daytona Beach, FL 32114.

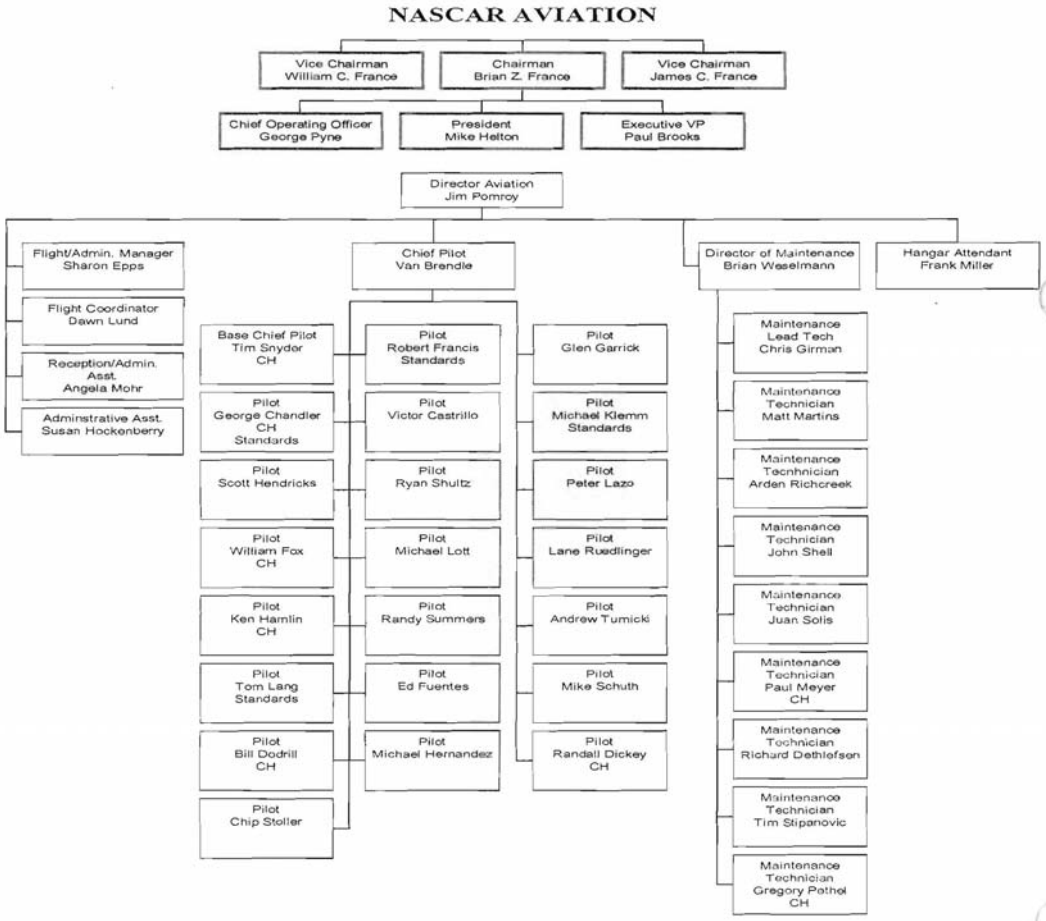


Figure 2 – NASCAR Organization Chart from SOP

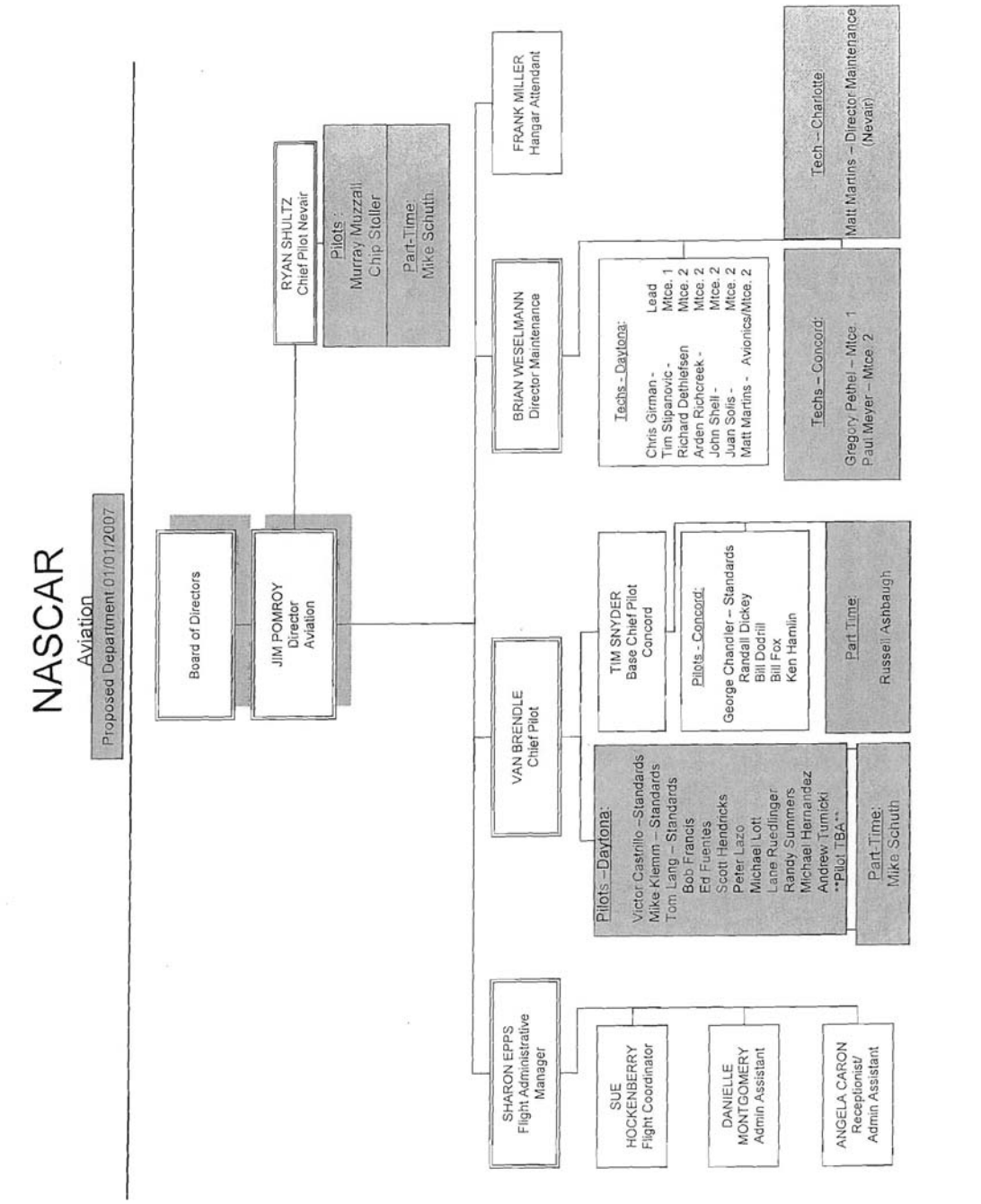
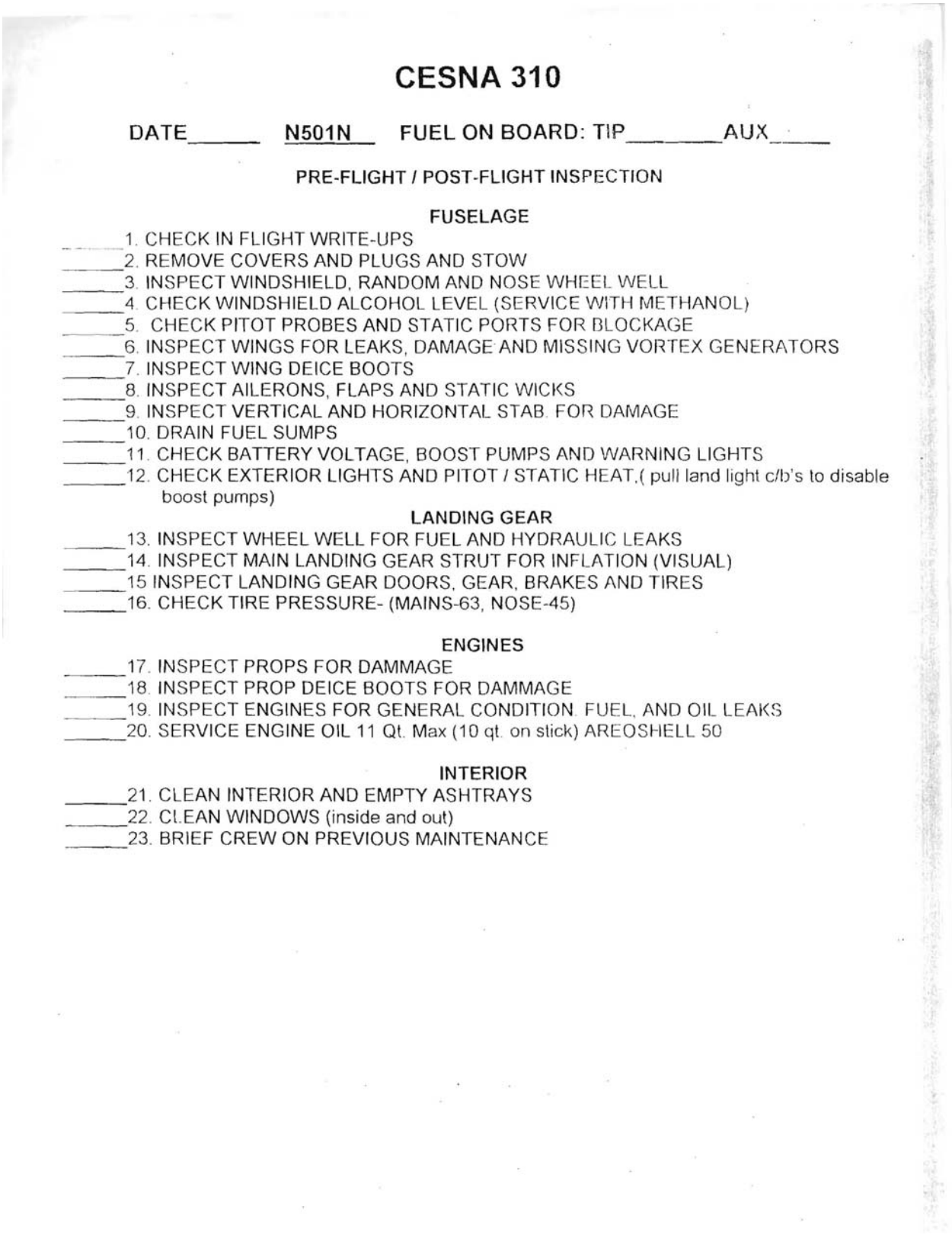


Figure 3 – NASCAR Organization Chart



CESNA 310

DATE_____ N501N__ FUEL ON BOARD: TIP_____AUX_____

PRE-FLIGHT / POST-FLIGHT INSPECTION

FUSELAGE

_____1. CHECK IN FLIGHT WRITE-UPS
_____2. REMOVE COVERS AND PLUGS AND STOW
_____3. INSPECT WINDSHIELD, RANDOM AND NOSE WHEEL WELL
_____4. CHECK WINDSHIELD ALCOHOL LEVEL (SERVICE WITH METHANOL)
_____5. CHECK PITOT PROBES AND STATIC PORTS FOR BLOCKAGE
_____6. INSPECT WINGS FOR LEAKS, DAMAGE AND MISSING VORTEX GENERATORS
_____7. INSPECT WING DEICE BOOTS
_____8. INSPECT AILERONS, FLAPS AND STATIC WICKS
_____9. INSPECT VERTICAL AND HORIZONTAL STAB. FOR DAMAGE
_____10. DRAIN FUEL SUMPS
_____11. CHECK BATTERY VOLTAGE, BOOST PUMPS AND WARNING LIGHTS
_____12. CHECK EXTERIOR LIGHTS AND PITOT / STATIC HEAT,(pull land light c/b's to disable boost pumps)

LANDING GEAR

_____13. INSPECT WHEEL WELL FOR FUEL AND HYDRAULIC LEAKS
_____14. INSPECT MAIN LANDING GEAR STRUT FOR INFLATION (VISUAL)
_____15 INSPECT LANDING GEAR DOORS, GEAR, BRAKES AND TIRES
_____16. CHECK TIRE PRESSURE- (MAINS-63, NOSE-45)

ENGINES

_____17. INSPECT PROPS FOR DAMMAGE
_____18. INSPECT PROP DEICE BOOTS FOR DAMMAGE
_____19. INSPECT ENGINES FOR GENERAL CONDITION. FUEL, AND OIL LEAKS
_____20. SERVICE ENGINE OIL 11 Qt. Max (10 qt. on stick) AREOSHELL 50

INTERIOR

_____21. CLEAN INTERIOR AND EMPTY ASHTRAYS
_____22. CLEAN WINDOWS (inside and out)
_____23. BRIEF CREW ON PREVIOUS MAINTENANCE

Figure 4 – NASCAR 'Pre-Flight/Post-Flight Inspection' Sheet for Cessna 310

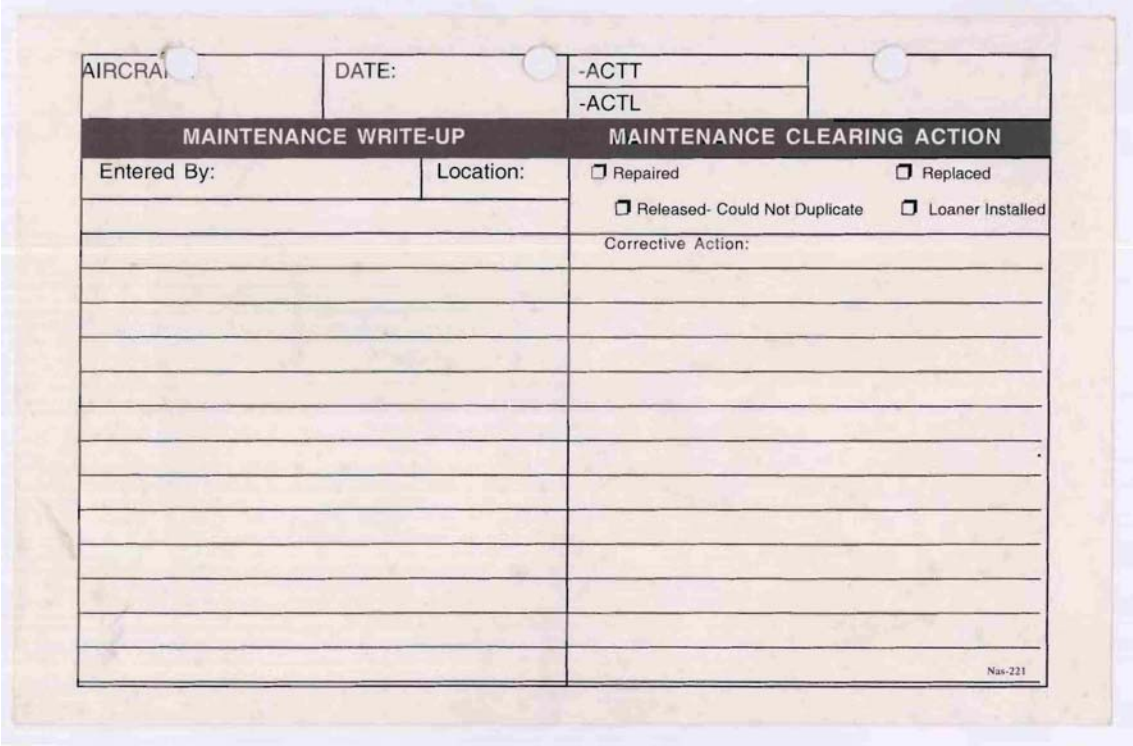


Figure 5 – Blank Discrepancy Reporting Form

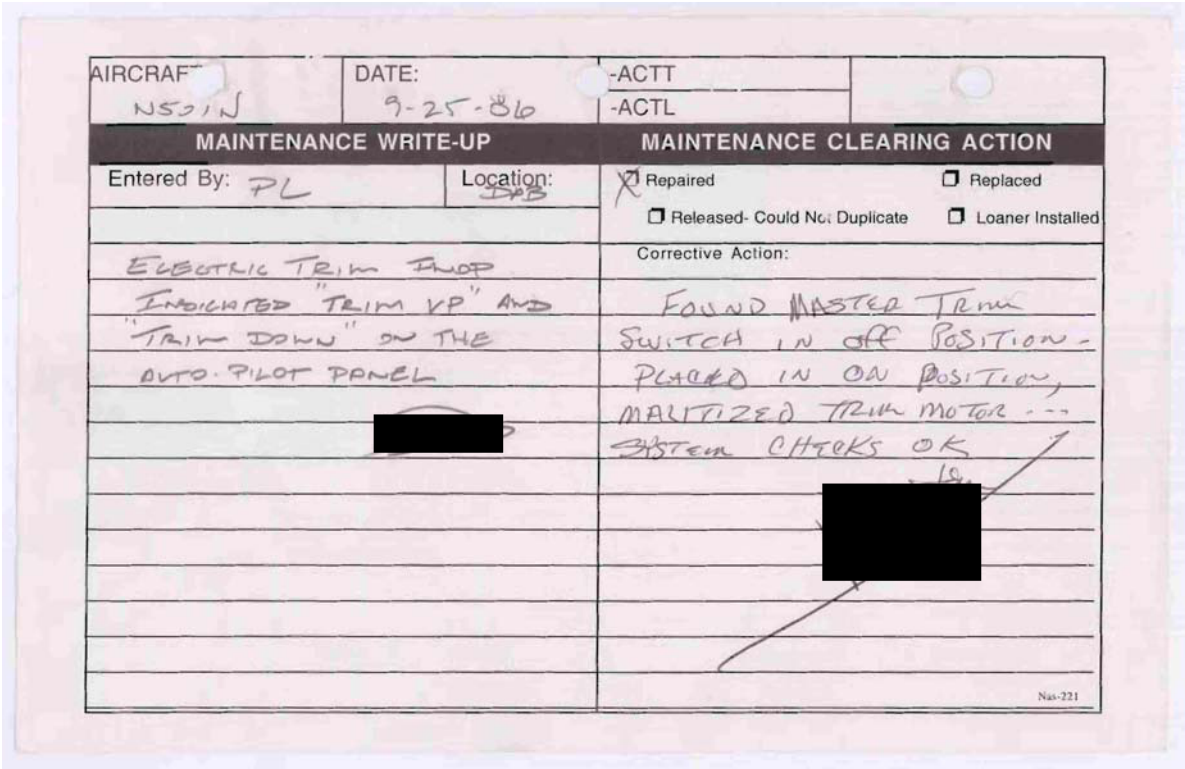
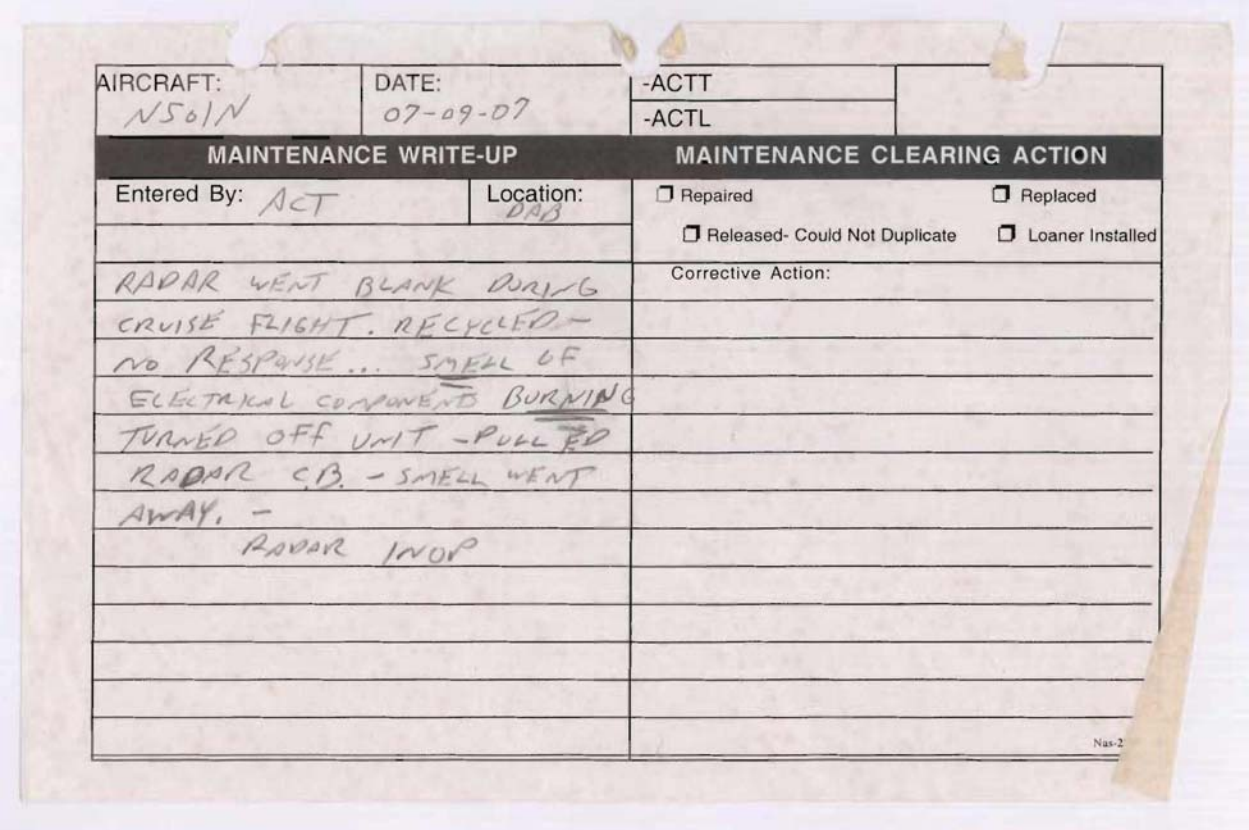


Figure 6 – Exemplar Completed Discrepancy Reporting Form



AIRCRAFT: N501N

DATE: 07-09-07

-ACTT

-ACTL

MAINTENANCE WRITE-UP

Entered By: ACT

Location: DAB

RADAR WENT BLANK DURING CRUISE FLIGHT. RECYCLED — NO RESPONSE ... SMELL OF ELECTRICAL COMPONENTS BURNING TURNED OFF UNIT - PULLED RADAR C.B. - SMELL WENT AWAY. —

RADAR INOP

MAINTENANCE CLEARING ACTION

❒ Repaired ❒ Replaced

❒ Released- Could Not Duplicate ❒ Loaner Installed

Corrective Action:

Figure 7 – Discrepancy Form Found at Accident Site, Showing July 9 Weather Radar Write-up