

Preflight Challenge



Safety Data Analysis
March 22, 2016

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Introduction

The Safety Team at Phoenix strives to be a world leader in SMS management in flight training. The primary goal of the SMS employed at CAEOAA is to identify and mitigate risks. Staff and students make up the Safety Culture of the organization and must be actively engaged in working with Safety on the forefront of their minds in order to meet this primary goal. This was the reasoning behind beginning a Safety Challenge activity on a regular basis. It is a means of engagement.

This event would not have been possible without generous support from CAEOAA Maintenance personnel including Jason Wolnik, Jim Colella, Stephen Matthews, Jeffery Perkins, Eloy Roldan, Scott Hilliard and our Center Manager - Dominiek De Roo.

Event Overview

The first Safety Challenge event conducted at Phoenix was a Preflight Challenge. In this event, an aircraft is set-up with various squawks and issues and then participants are given a short amount of time to preflight the aircraft and see how many issues they can catch. At Phoenix, we have two different basic training aircraft, the Archer TX and the Diamond 40. Two events were planned to allow for each aircraft type to be used, since students fly only one or the other. Safety carefully worked with maintenance when setting up the squawks on the aircraft, to allow for the aircraft to be returned to service without the possibility of leaving an issue uncorrected. Safety and Maintenance each had their own lists for redundancy which were crosschecked. Safety did our best to create squawks which represented past historical issues/trends identified by the safety system, as well as others which were used to get an idea of what crews focus on during preflight. The Safety Team did discuss how long to allow participants to preflight the aircraft for, and settled on 15 minutes for two reasons. First, crews surveyed informally by Safety prior to the event indicated it should take about 15 to 20 minutes to preflight an aircraft. We wanted to see if this actually was an appropriate time frame. Second, we wanted crews to feel under pressure to preflight, as they are typically under the same time pressures in daily operations.

In the interest of safety:

1. The battery was removed or leads disconnected to prevent accidental powering up of the aircraft.
2. The spark plug leads were disconnected from each spark plug to prevent any possibility of engine start.

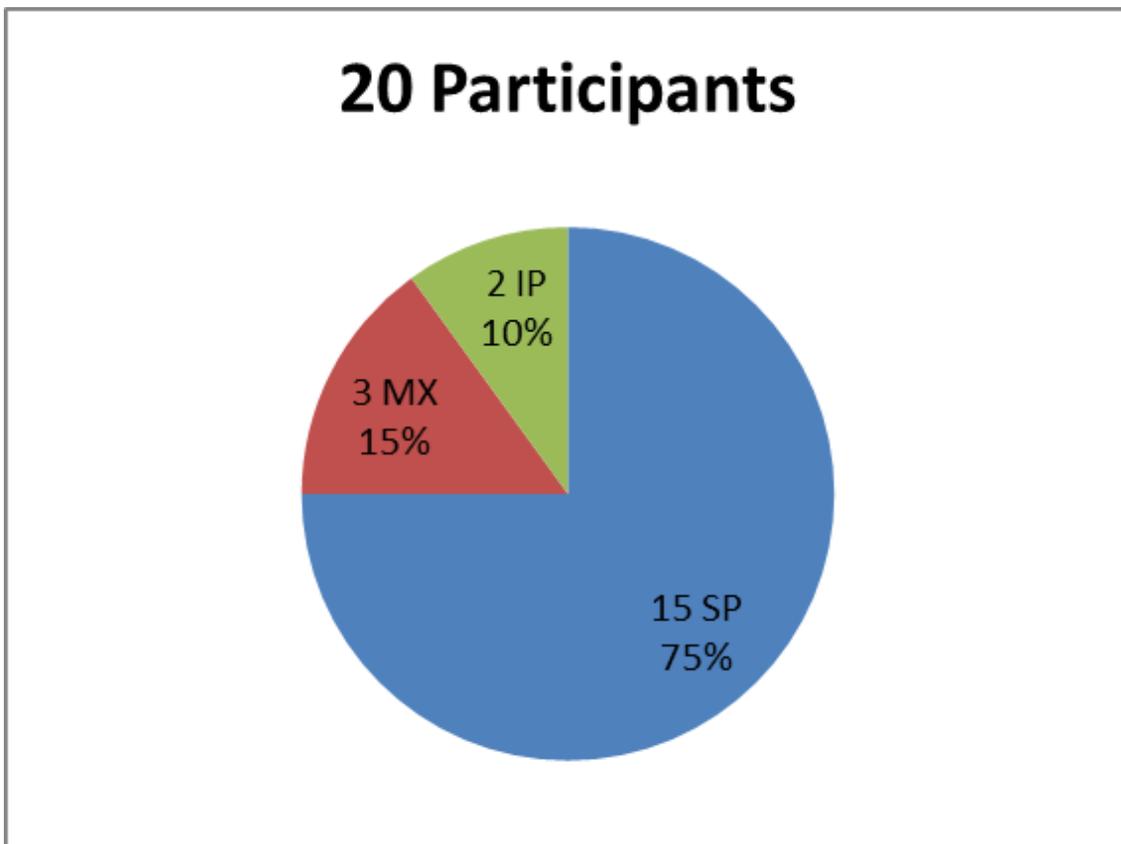
The aircraft was placed in the Maintenance hangar to minimize the impact and danger of the ramp area. Students/Staff arrived voluntarily when their schedule allowed, and were given a clipboard, a blank squawk list, and then briefed on the specific rules. A member of the Safety Team served as a moderator and was in charge of briefing each participant, timing them, and monitoring the safety of the participants and the aircraft. The general rules used during the event:

1. No powering on the aircraft.
2. Leave everything as you found it, don't correct any issues discovered.

3. The aircraft is safe (this was told so that those finding the magnetos on would not panic.)
4. You have 15 minutes to preflight.
5. Use caution before moving flight controls, as somebody may be on the other side of the aircraft and could be pinched.
6. Leave the doors open, sunshades have been removed on purpose for visibility.

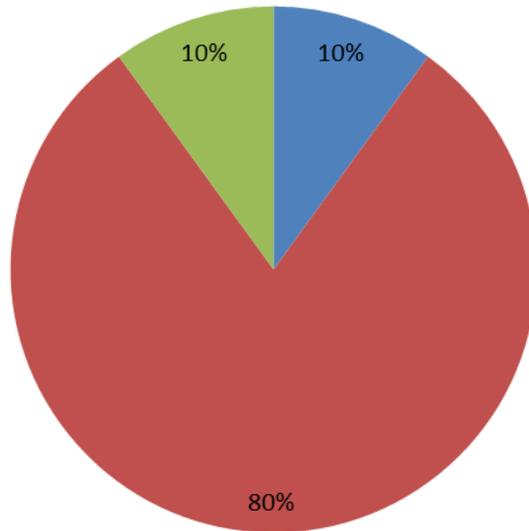
The event ran on March 7th and March 14th from 0800 to 1800 local time. Following the event, the squawk list was followed and each item was corrected to bring the aircraft back to airworthy status. As stated earlier, two squawk lists are referenced to ensure nothing is missed. Each participants list of discoveries were reviewed and graded by the Safety Office to ensure accuracy. For instance, if a participant stated three squawks for Left wing dirty, windshield dirty, and navigation light dirty, these would only qualify as one squawk (dirty aircraft). Data collected from the Challenge was then entered into a spreadsheet for analysis.

Archer TX Results – March 7th, 2016

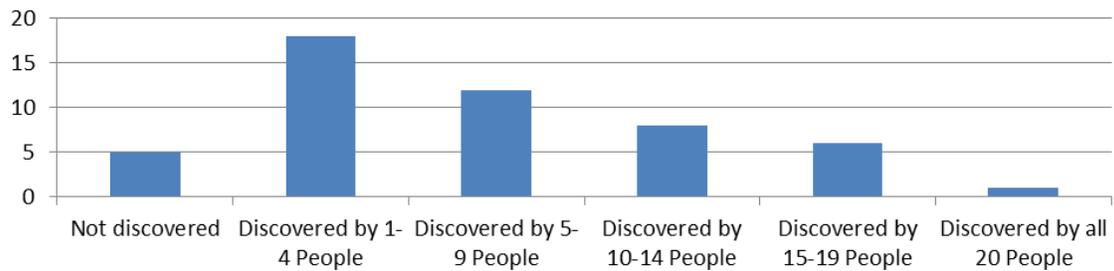


Percentage of People who Found...

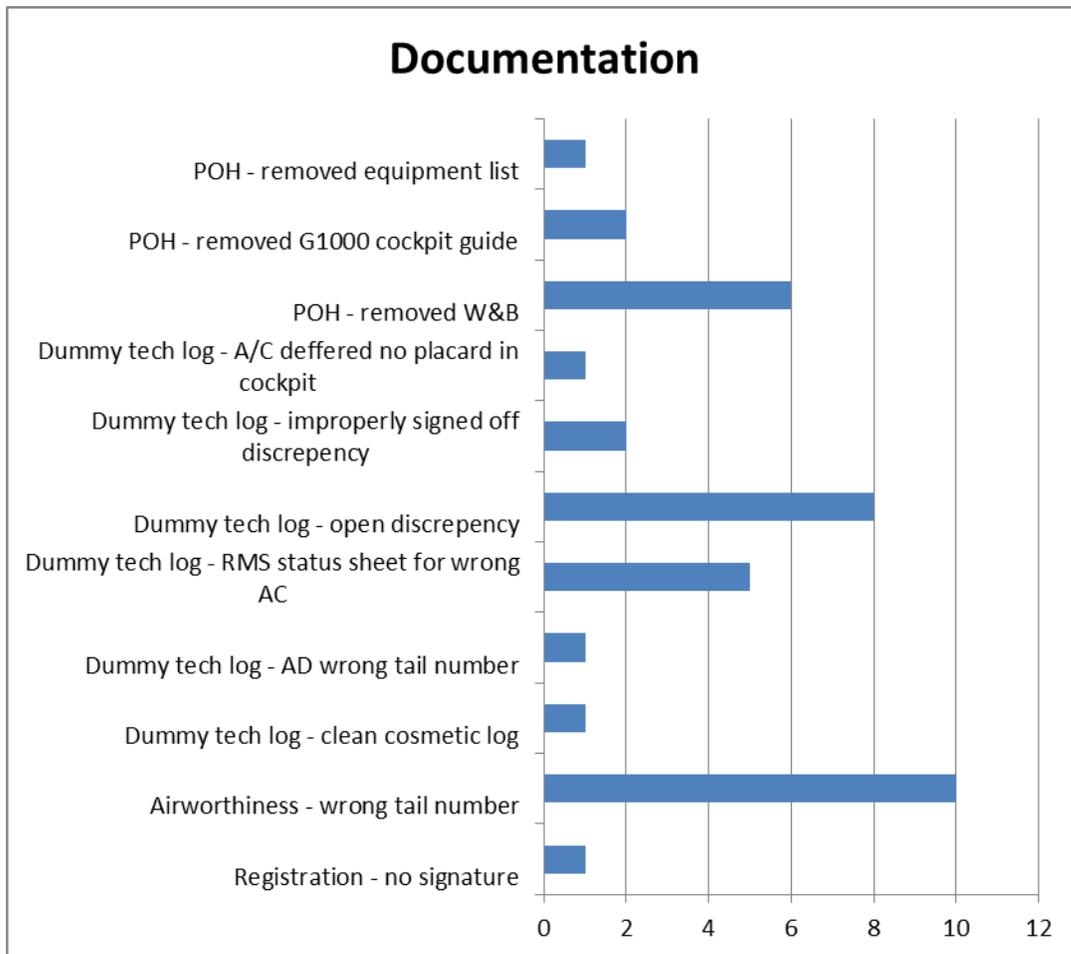
■ 1-10 things ■ 10-20 things ■ 20-30 things



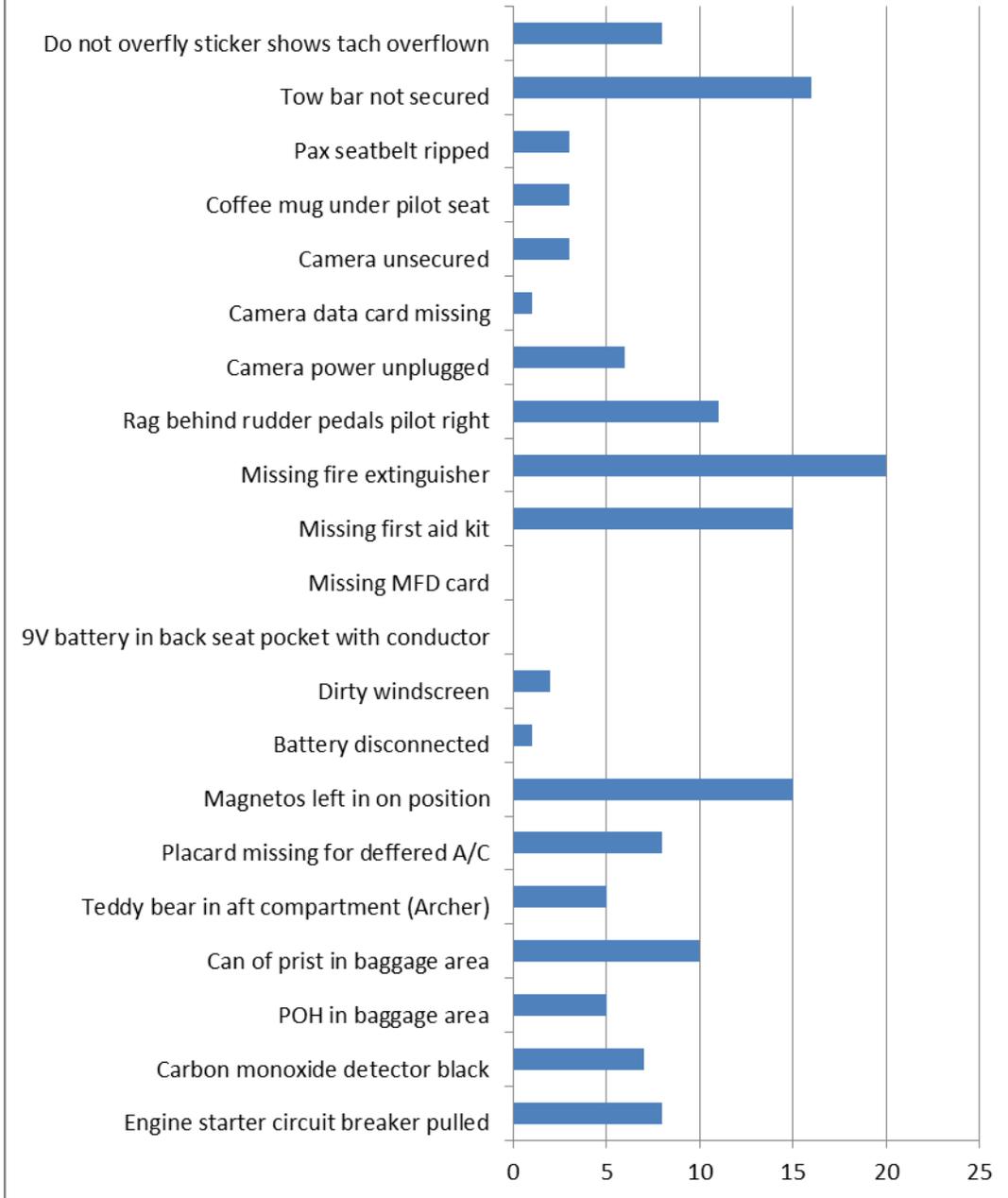
50 Discrepancies

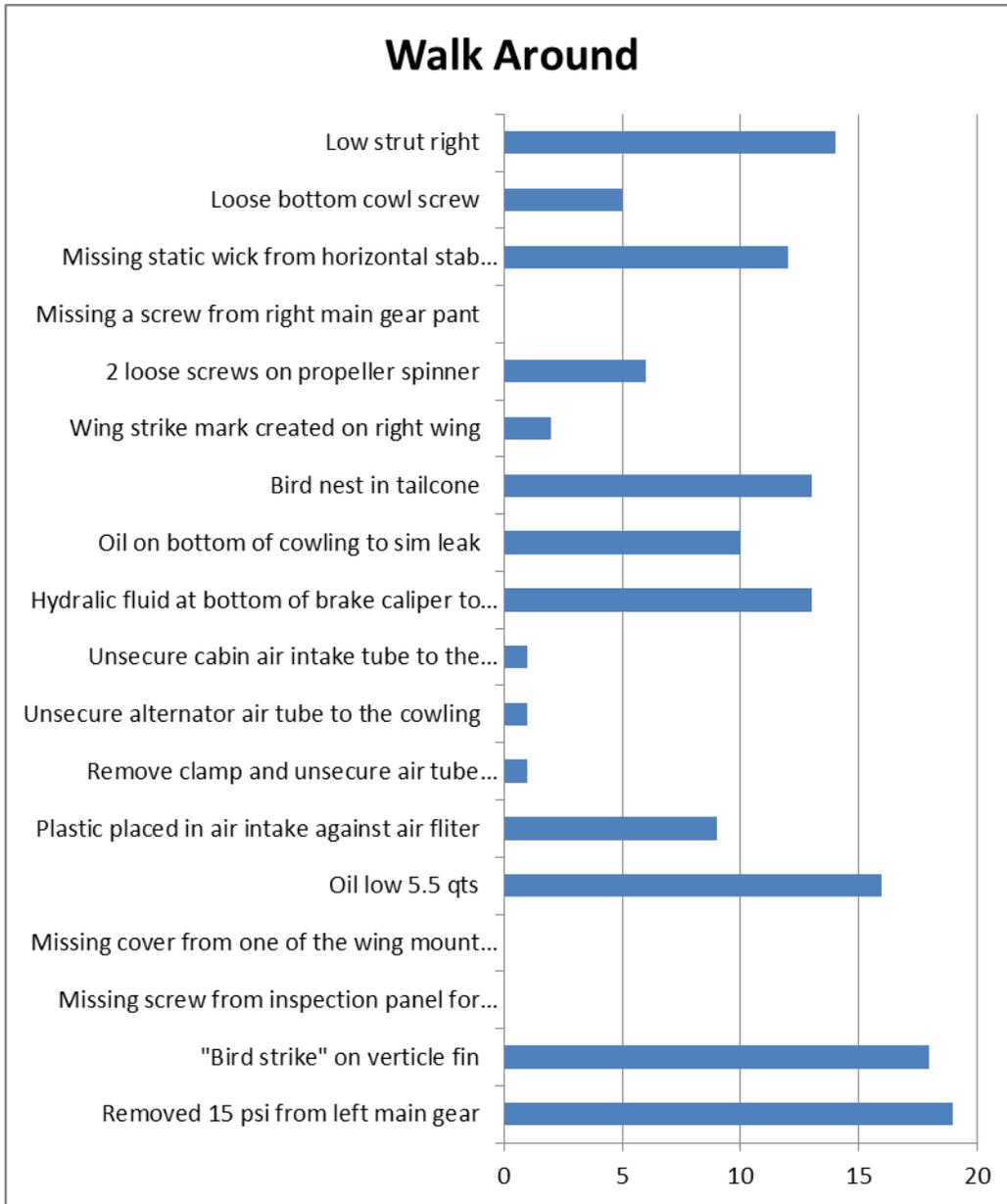


The graphs below show numbers of people who caught the listed issues. Those items with small numbers indicate weak areas in preflight skills which can be tied back into training.



Cockpit





Archer TX Analysis

Historically, items under the wing are frequently missed by flight crews. Data from the preflight challenge also supports this, as only 6% of discovered items were under the aircraft. 50% of discovered items which did not require getting under the aircraft were found. Of interest, a 5 inch by 6 inch cover, which screws on over the wing mount bolts was removed, and was not caught by any of the participants. A simulated wing strike mark (1/8 inch in width) to the underside of the wing located approx 15 inches from the wing tip, black in color against the white bottom spanning from 6 inches from the leading edge to almost the trailing edge of the aileron of the right wing was found by 2 participants out of the 20.

The most found discrepancies were tied between an instructor and mechanic with 22 total finds each. The next most found was a student pilot with 19 finds. The least number of finds was a student pilot with 10.

The top items found were (≥ 13 or more than 65% discovered):

- Low tire pressure
- Bird strike on vertical fin
- Low oil
- Missing fire extinguisher
- Tow bar not secured
- Missing first aid kit
- Magnetos left on
- Hydraulic fluid leak from main gear (puddle on floor)
- Bird nest in tailcone
- Low right main strut

The top missed items were (not discovered):

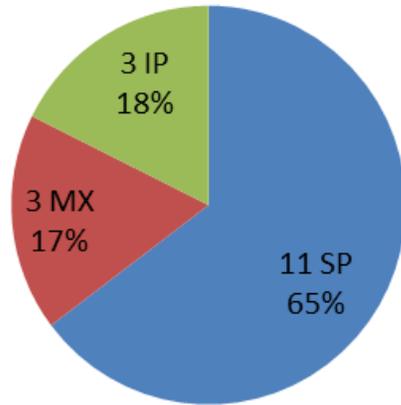
- 9V battery in back seat pocket with conductor nearby
- Missing MFD data card
- Missing screw in inspection panel under belly
- Missing cover from right wing mount bolts
- Missing screw from right main gear pant

It should also be noted that the aircraft documents were an area of weakness as well. Seven issues in the Tech Log were only discovered by 1 or 2 participants. While the majority of the participants were witnessed looking at the aircraft documents, the fact that many items went unnoticed seems to indicate they don't know what to look for. In training, acronyms are sometimes use to train students such as ARROW for aircraft documents (Airworthiness, Registration, [Radio Permit-INTL only], Operating Limitations, Weight and Balance). It seems that these items were checked for their presence only. The Tech Log which was set up for the aircraft also indicated similar results. They would notice that the air conditioner was deffered, but did seem to correllate that there should be a placard in the cockpit and vice versa with other items.

It was also interesting to note that the majority of participants did not use a checklist or flashlight during preflight.

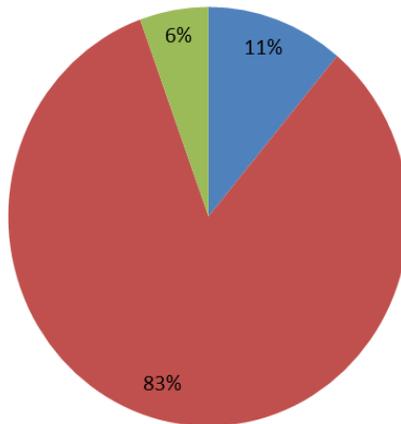
DA40 Analysis

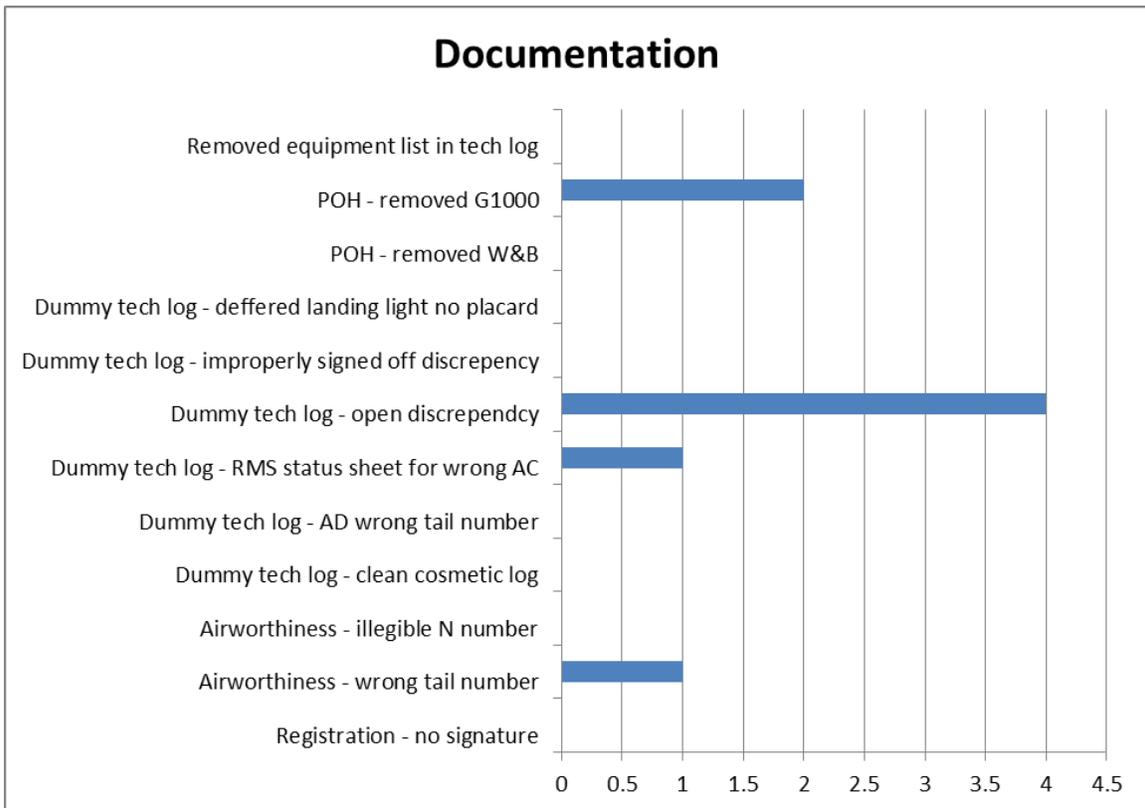
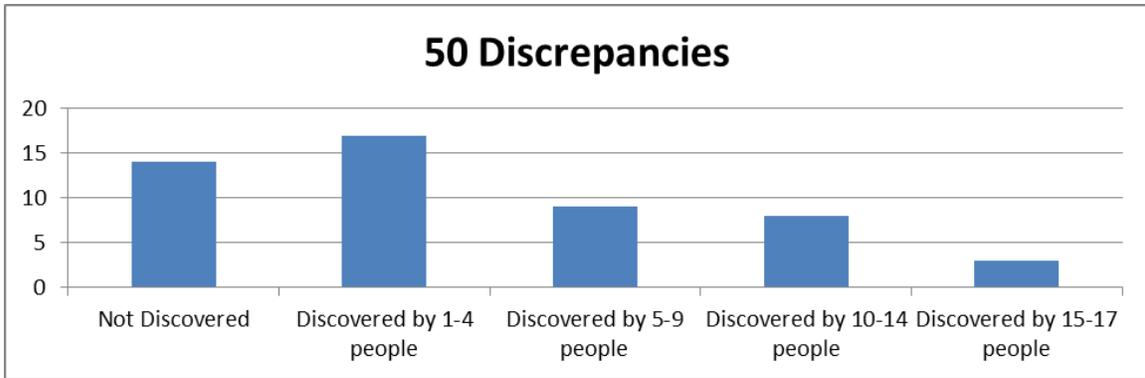
17 Participants



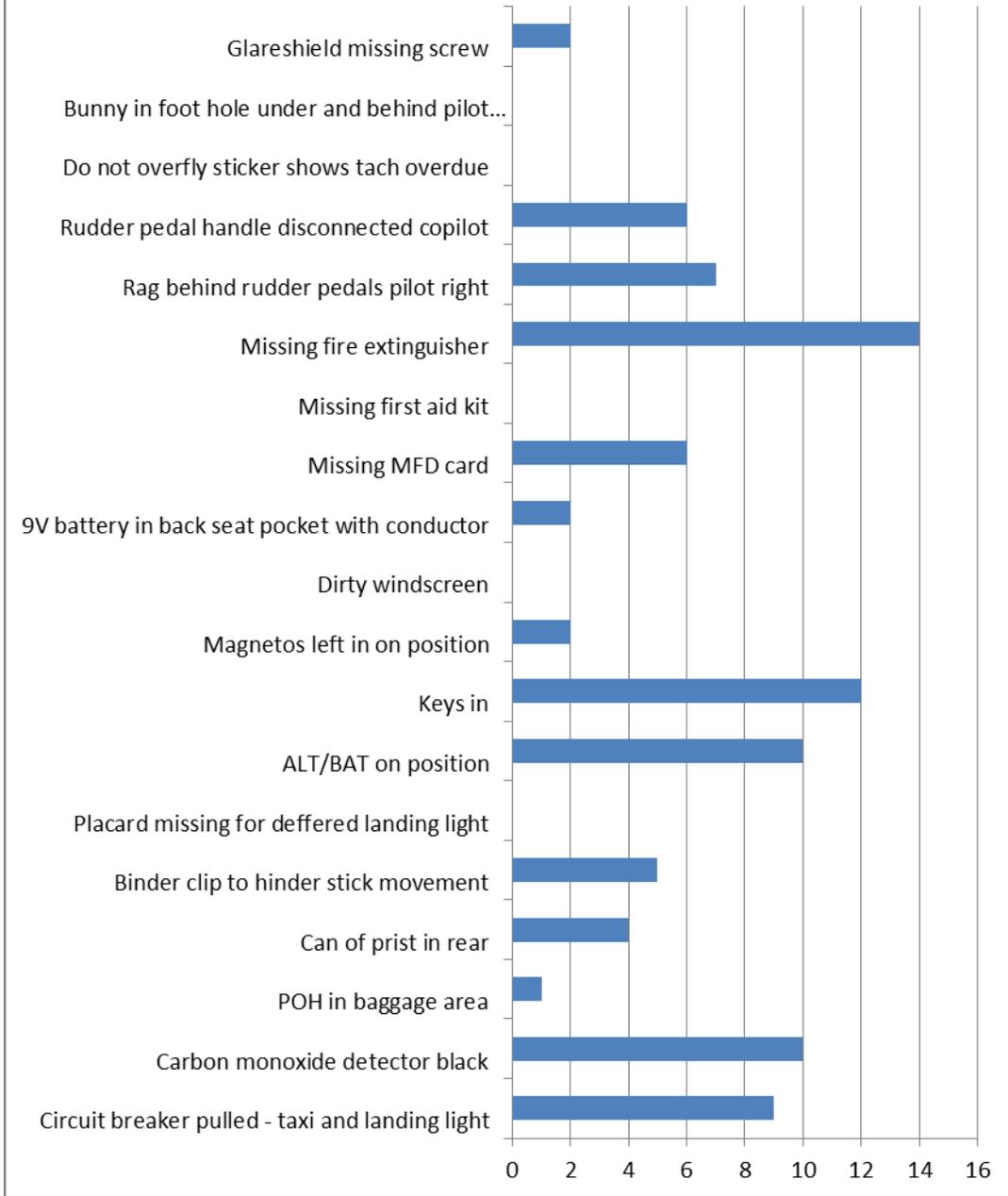
Percentage of People who Found...

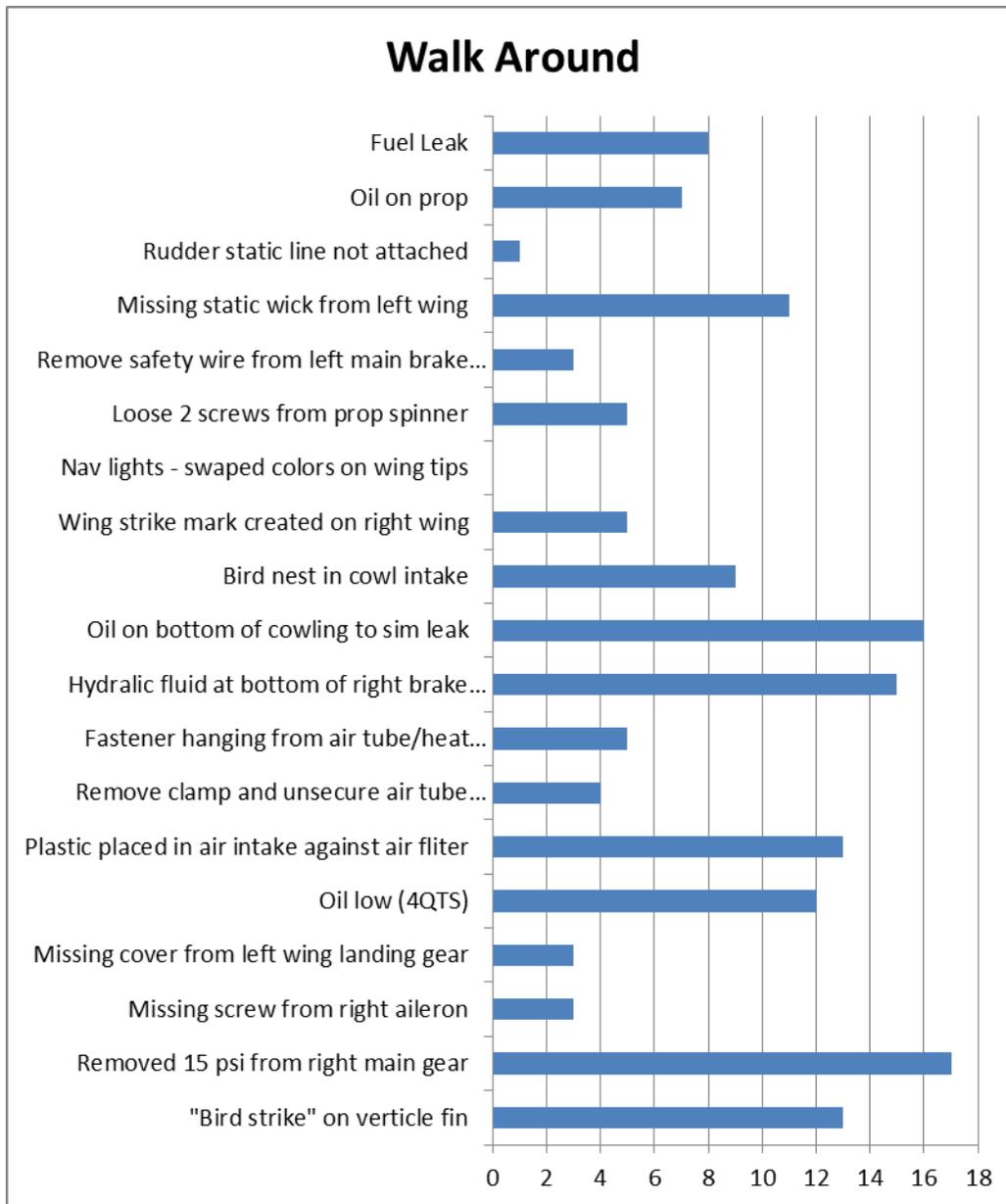
■ 1-10 things ■ 10-20 things ■ 20-25 things





Cockpit





The vast majority of participants did not catch documentation errors with the aircraft. It may be that the majority of students in the DA40 are non-native english speakers/readers. Therefore, reading through elements on the tech log takes more time and attention than other student who are native to the language.

While slightly better than the Archer, crews still lacked catching issues which were located under the aircraft. Similarly with the Archer, the data on DA40 does indicate that crews only caught 21% of items located under the aircraft. 50% of items which were in plain view were discovered.

Only 35% found the black wing strike mark under the right wing.

The most found discrepancies were from a student pilot with 21 discoveries. Next runner up was a student pilot with 20. This was followed by an instructor with 17 discoveries.

The Top found issues with the DA40 were (≥ 11 or more than 65% discovered):

- Low tire pressure
- Missing Fire Extinguisher
- Oil on bottom of cowling (dripping on floor)
- Hydraulic fluid leaking from right main
- Bird strike on vertical fin
- Plastic in the air filter
- Magnetos left on with keys in
- Oil low
- Missing static wick

The top missed items were (< 1):

- Removed equipment list
- Removed weight and balance
- Deffered landing light with no placard
- Improperly signed off discrepancy
- AD status sheet with wrong aircraft N-Number
- Airworthiness with illegible N-Number
- Registration had no signature
- Stuffed animal under pilot seat in foot hole
- Missing first aid kit
- Dirty windshield
- Navigation light colors were swapped from opposite wing tip

Overall Analysis and Conclusions

In order to do a thorough preflight, most participants indicated more than 15 minutes was required, as several stated they did not finish their walk around when time was called. Keep in mind that those participating in the Challenge did not have to power on and check lights and such, which would have taken more time. Interestingly, there were a few students who were seen walking around the airplane several times within the 15 minute period and there were even some who said they were done before time was called (typically within the last 3 minutes).

Data indicates that:

- The majority of items located under the aircraft were missed by participants.
- Items caught by the majority were in visual line of sight.
- There is a lack of training of crews to have a working knowledge of elements related to RMS status sheets, AD compliance sheets, POH elements, and deffered items.
- Items both on and off the aircraft walk around checklists were missed.

- Participants typically did not reference a checklist.
- Participants do not use a flashlight to aid in preflight.
- Participants do not check data cards or cameras, despite repeated briefings from Safety to comply with Global Policy. 4 participants in the DA40 discovered the data card missing, and no one found the card missing in the Archer TX.

Recommendations

1. Crews would benefit from a formal ground training on preflight walkaround training for each aircraft type. This training should cover all items on and off the checklist and what possible issues to look for and think about when conducting a preflight. Techniques to aid in preflight skills can be taught as well (such as using a flashlight, checklist, or methods of checking components for defects). Safety has a decent library of photos which could be used to aid in training. A necessary part of this training is the emphasis placed on looking under the aircraft. Safety does brief some general tips in the initial safety briefings, but this may not be sufficient.
2. After the recommendation in item #1 has been fully implemented, conduct another Preflight Challenge event and compare result to determine training effectiveness.
3. Crews need training on the Tech Log and how to decipher each page in the book and what common errors to look for. These pages include the RMS status sheet, Yellow discrepancy logs and white deferral sheets.
4. Crews need training on what specific items they are looking for in the POH and aircraft documents (registration, airworthiness, weight and balance, etc.)
5. Checklists need to be updated to include checking cameras and MFD data cards if installed. This is a mandatory Global policy, which is not being followed by instructors and is not being taught to students. While this may seem to pose little risk to flight crews in the moment, the inability of Safety to gather the available data from the onboard camera and data cards following an accident can allow risks to go unidentified and cause latent failures leading to accidents.
6. Ensure that crews are given the necessary amount of time to preflight an aircraft. While this challenge did not answer the question of what amount of time is required, it should be noted that 15 minutes appears to be inadequate.