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Date: **December 31, 2016**

Subject: **General Aviation Survey Stakeholder Meeting Summary and Recommendations**

The General Aviation Joint Steering Committee (GAJSC) Safety Analysis Team (SAT) is tasked with improving the safety data available about general aviation. This includes continuing the work of the General Aviation Data Improvement Team (GADIT) that worked from 1997 through 2009 to enhance the general aviation accident and exposure data.

The SAT arranged a General Aviation and Part 135 Activity Survey Stakeholder meeting on September 10, 2013 to discuss opportunities to enhance the quality and content of the current general aviation survey, its surrounding processes, and the output published by the FAA. The FAA – at that time – was not able to implement some of the changes recommended through the meeting due to problems with the 2011 survey. As a result, industry held a second meeting with the FAA on May 26, 2016 to review the validity of the earlier recommendations, discuss additional feedback provided over the three prior years, and specifically discuss the avionics section of the survey which did not receive sufficient attention in 2013.

This memo summarizes the discussion and conclusions of these two meetings and resulting recommendations for change. The FAA is encouraged to work with industry and agency stakeholders to implement these changes for the 2016 survey.

Technical Briefings and Background Material Provided to the Group

The stakeholders were provided a detailed briefing by the GA survey contractor (Tetra Tech) of the methodology currently employed for the survey and the possible impact on the survey results from the mandate to re-register all aircraft between 2010 and 2013.

It was noted that numerous activities have occurred during the past decade to enhance the general aviation survey including:

- the 2001 GADIT Activity Report;
- various recommendations from the National Transportation Safety Board (NTSB);
- prior meetings with stakeholders;
- and commentary from the Government Accountability Office (GAO).

All meeting attendees were provided copies of these reports and the current survey methodology[1] for review.

Overview of Discussion

The group reviewed the survey, the data requested in the survey, and results published online by the FAA.

The group discussed the objective of the GA aircraft survey and other data improvements that will support better understanding of general aviation, enhancing general safety, and research about the industry. Specifically, the group focused on two areas: (1) understanding the operation of aircraft; and (2) understanding how pilots fly.[2]

Surveying Pilots as Opposed to Aircraft

Several stakeholders have discussed the benefit that would be obtained from developing a better data about pilot demographics and typical flying and that this data could be obtained by surveying pilots.

The group discussed whether a survey of pilots would be more useful than a survey of aircraft. The aircraft survey has been conducted by the FAA annually since 1978. Several viewpoints were raised including the importance of understanding the typical recent flight experience of non-accident pilots and comparing that to accident pilots; understanding the type of training and education obtained by pilots; and measuring the effectiveness of FAA and industry safety outreach. It was noted that additional data about pilots and their typical operations would be of interest for the purpose of safety analyses. One group (LOBO) provided a proposed set of topics that could be covered in a pilot survey that include total time, recent time and time since and time since last flight review. Other information of interest include whether a pilot participates in flying clubs and FAA WINGS seminars. The stakeholders encouraged the FAA to engage those groups interested in conducting a pilot survey to better determine the use of the results of such as a survey and also the types of topics that should be explored in the questions. (Note – some of this work is now under consideration by the GAJSC SE-33 safety culture project.)

A survey of pilots, however, would not be as effective in determining the amount of general aviation flying conducted on an annual basis which is the FAA primary objective for conducting the annual survey. As an example, the survey of aircraft ensures that there is no "double counting" of flight time (*e.g.*, a student flying with an instructor or an aircraft requiring a two person crew both record the same time period) when attempting to determine the total flying conducted in the airspace. It was further noted that a survey of pilots as opposed to aircraft introduces new obstacles such as pilot privacy and requirements placed on researchers that collect information about private individuals.

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[1] GAJSC GADIT Activity Data Task Report, June 15, 2001; 2010 GA Survey Methodology; GAO-13-36 General Aviation Safety – Additional FAA Efforts Could Help Identify and Mitigate Safety Risk

[2] The group did not discuss the need for enhancing accident data since other efforts have been underway over the during 2013 to improve accident data including the National Transportation Safety Board (NTSB) holding listening sessions with the aviation community and the NTSB-FAA cooperation to coordinate on what is collected by the two agencies during GA accident investigations.

The group concluded this discussion by noting the benefit of enhancing the information about how pilots fly ("flying color and context") while recognizing the role of an annual survey of aircraft to determining total flying in the National Airspace System.

Surveying Aircraft versus Mandatory Reporting

The group discussed if mandatory activity reporting should replace obtaining activity and other data about general aviation through a survey. It was noted that the survey has a high response rate (e.g., 2010 at 44.2%); a mature methodology for stratified samples across the population; a low aggregate %-standard error (0.7% to 1.5% indicating the data is representative of the population); and support from the community.

Additionally, there were questions from the community about whether it would be appropriate to establish mandatory reporting for an activity that primarily is recreational in nature and the stakeholders questioned the whether the FAA would be able to support the required rulemaking for mandatory activity reporting for general aviation.

To close out the discussion about how to understand the accuracy of the survey, Tetra Tech developed an overview of the how interested parties can assess the accuracy of the survey results. This summary is included in Appendix D to this document.

Primary versus Secondary Survey Data

The discussion was split into two segments: Primary Survey Data (hours flown, active aircraft, and state / region of operation) and Secondary Survey Data (categories of flying, flying conditions, fuel data, landing gear systems, and avionics / equipment).

Survey Methodology

The group was provided with an overview of the improvements made to the survey methodology including shifting to an internet survey and utilizing a large fleet survey to increase the response rate for operators of more than three aircraft. A complete overview of the improvements made to the survey is available in online documentation[3] to the survey.

The group discussed several opportunities to further refine the survey methodology including:

- Benefits of transitioning to CAST / ICAO Common Taxonomy consistently through FAA databases such as the FAA Aircraft Registry. Currently, production of the make/model data (not published) is impeded by inconsistent aircraft name taxonomy. Stakeholders benefit from make/model data and further enhancing the make/model data availability would be beneficial to Continued Operational Safety (COS) efforts including better targeted Airworthiness Directives.

[3] See, Appendix A, specifically Tables A1-3; Methodology for the 2010 General Aviation and Part 135 Activity Survey.

- Conducting comparative reviews of survey results. As an example, the turbine (turbojet) data is closely correlated with TFMS-C (previously ETMS-C) for business jets.[4] The FAA should look for additional opportunities to correlate the data including the Energy Information Administration (EIA) U.S. Refinery and Blender Net Production of Aviation Gasoline[5] tables.

- Continuing to monitor the impact of the re-registration rule on the aircraft registry through the 2014-2015 timeframe.

Technical Review of the Survey Tool and Output

Q1: Was the Aircraft Flown in the Survey year. The group discussed expanding the set of descriptions for why an aircraft had been inactive in the survey year. The group recommended the inclusion of "parted out" and "maintenance or repair" to be included. (Note – these changes were included in the 2013 survey.)

Q7: Category of Flying. This question asks the respondent to identify by category of operations by percent what type of flying conducted in the aircraft (in context of Q4 which asks for total flying during the year). Currently, most respondents only provide data in one or two categories. The group discussed two categories that may warrant further clarification in their description (especially because the description is not published with the survey results for context).

- *Instructional.* This flying is identified as "Flying under the supervision of a flight instructor, including student pilot solo", but identifies a number of exemptions that are then captured in the "other" category (such as, positioning flights, proficiency flights, training, ferrying, sales demo). The group believes the intent of this question is to capture a pilot (who's highest certificate or rating may be any class) conducting a flight toward certification or obtaining recertification together with a flight instructor. This can be better captured by clarifying the exemptions including whether "ferrying flights" (which typically are limited to exclude instruction) and whether "training" is the correct exclusion or "practicing".

- *Corporate/Executive Transportation* compared to *Business Transportation.* This question attempts to capture different safety level by specifically calling out "with" or "without" a paid crew to attempt to capture current practice (such as, "with a paid crew" likely means that person obtains regular training in a formal Part 142 environment). It was noted that the term "corporate / executive" is being phased out by the aviation community and that this question may be betted identified by calling the categories "Business Transportation – without Paid Crew" and "Business Transportation with Paid Crew" in the name as opposed to just the description. (Note – the FAA implemented this change in the 2013 survey.)

The group also discussed the fidelity provided about Aerial Observation, Aerial Application in Agriculture and Forestry, and Other Aerial Application and it was noted that these three categories capture unique types of operation that help inform the community about general aviation flying and should be retained.

Q8: Fractional. The group discussed the current fractional operator question which was introduced following the FAA establishment of 14 CFR Part 91 Subpart K ("Part 91K") to specifically monitor the

[4] https://aspm.faa.gov/

[5] http://www.eia.gov/dnav/pet/PET_PNP_REFP_DC_NUS_MBBLPD_M.htm

number of hours flown subject to these rules. This question, however, has generated significant confusion due to non-Subpart K operators responding based on joint-ownership and flying clubs that market themselves as "fractional" while not subject to Subpart K requirements.

The group agreed that this question can be removed from the small fleet survey, because there are no Part 91K operators that only operate one aircraft. The group recommends that the FAA only send the fractional question in targeted questionnaires to those operators that hold an MSPEC (Part 91K) authority which likely are approximately 7-8 operators in total or, alternatively, retain the question only in the large fleet survey. A targeted question to these operators about what percentage of their flying that was conducted under Part 91 (*e.g.*, position / management flights), Part 91K (fractional), and Part 135 (on demand charter) would provide a complete picture of the total fractional flying conducted in the NAS.

The group also asked if use categories for fractional operators can be limited to a handful of categories and not include operations such as "aerial observation" which would not be conducted as a fractional flight.

Q10: Percent flown for federal, state, or local government. The FAA should review the purpose of this question and whether it is intended to understand the aircraft is operated as a "public aircraft" or something else. Based on this review, the FAA may want to update the language of the question to align it better with the objective identified.

Q11: Flying Conditions. The group discussed the current question which was significantly redesigned as a table approximately five years ago. The redesigned question is more effective and avoids double count between categories. A question was asked whether the great fidelity provided in the output (*i.e.*, the number of tables) provides too much information and can be reduced in favor of a simpler set of output by aircraft type categories. Who are the users of data at this degree of fidelity?

Q12: Landings. The existing survey queries the respondent about "How many landings did this aircraft perform in 201X" which is published in Table 2.4 only.

The group discussed the interest from several stakeholders, including the safety research community, to understand the number of flights as opposed to the hours flown by general aviation, because for certain analyses it may be a superior assessment of relative risk between different segments of general aviation. As an example, the FAA has funded an initial research survey with CGAR to ask pilots about their typical flying and the number of flights conducted.

The group discussed the limitations of the current survey about the number of landings (Q12 / Table 2.4) which produces data about total landings by FAA type of aircraft and FAA region and total. As an example, in 2010 the survey indicated 1,426,395 (2.8% Standard Error) landings by EAB aircraft of a total of 41,088,971 (1.6% Standard Error).

Concerns were raised about the "GIGO risk" when using landings to assess safety, because total flight time during a year is likely easier to obtain (*i.e.*, pilot or aircraft log books and Hobbs time) compared to a pilot having to remember the number of landings unless a WOW-switch was installed.

Q13: Type of Landing Gear. The group discussed the current question, which asks the respondent about which of six different types of landing gear is on the aircraft. A question was asked whether this type of

question is still of importance (*i.e.*, what type of safety analysis is done about fixed versus retractable gear aircraft) and whether this type of data can be obtained by flagging aircraft make/model information as fixed or retractable gear using the aircraft registry. It was also noted that there are landing gear questions asked online, the results of which are not reported publicly. Additionally, a question was asked whether the fidelity in the output (i.e., the number of tables) provides too much information and can be reduced in favor of a simpler set of output by aircraft type categories. Who are the users of data at this degree of fidelity about landing gear on aircraft? The group noted that these one-off questions should be reviewed by the FAA to determine their role in the survey and the process for their inclusion.

Q14 and Q15: Fuel. There is significant interest from stakeholders in the amount of fuel consumed in general aviation to help inform policy decisions about the environment and taxes.

It was noted that attempts to align the results from the fuel table (Table 5) and the hours flown (*e.g.*, Table 1-2) do not seem to correlate.

The group noted that there are new fuels expected to come online for use by general aviation, including UL93 toward the end of this decade, which needs to be acknowledged in the survey form at that time.

Additionally, the group noted that the avgas data survey results seem to align with aggregate data from the Energy Information Administration[6], but that the Jet-A data does not achieve the same correlation with EIA data because of to the combination of commercial and general aviation use of Jet-A fuel.

It was further noted that the fuel question is asked differently between the single aircraft survey form and the fleet survey form (*i.e.*, average versus total) and a question was asked how this was handled in the processing between different types of aircraft (*e.g.*, what is the impact if turbojet airplanes more often are subject to the large fleet form).

The group discussed the low response rate for the "Jet Fuel – Piston" question. It was concluded that this was to be expected based on the low penetration of compression ignition (diesel) engines in the GA fleet. The group recommended that the "Jet Fuel – Piston" question be updated to achieve improved clarity for the respondents by asking for "Jet Fuel – Piston (Diesel)". The response rate to this question should be expected to increase as more diesel engine (*e.g.*, Diamond using Austro and others using Continental engines) enter the fleet. Alternatively, the group noted that simply asking about the fuel used as opposed to "fuel used in what engine" may improve the clarity of the question (e.g., in place of "Jet Fuel – Piston" simply asking "Jet Fuel").

The group also noted that the term "Aviation Fuel" and "AvGas" are not necessarily used consistently in the survey and the contractor is updating this to avoid any risk of confusion.

Q16-17 Aircraft Icing Capability (2013 survey). The group discussed questions for which the results of the survey are not provided. As an example, in the 2013 survey the questions about Q6 (Flight in Alaska), Q16-17 (Aircraft Icing Capability), and Q18 (Aircraft certified and maintained to operate IFR) are asked of the respondents, but the results are not necessarily part of the results published by the FAA.

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[6] See, U.S. Refinery and Blender Net Production of Aviation Gasoline, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mgarpus2&f=m [Accessed on September 10, 2013]

The group concluded that the FAA should internally review with agency stakeholders if these questions should still be asked or, as an example with the icing question, they have been overcome by events since the associated rulemaking activity that was the impetus of the inclusion of these questions (i.e., FAA GA Icing ARC) have been concluded.

The group also noted that the current icing question is negative (*i.e.*, "…was this aircraft prohibited from flight into known icing?") The group recommends that this question instead be asked in a positive way. Additionally, the group discussed whether it would be possible to understanding additional details for how the aircraft was certified for flight into known icing (*e.g.*, section 34 under SFAR 23 or Part 25 Appendix C), but concluded that the aircraft owner likely would not know this information since it is not shown in the AFM, but instead only in the aircraft Type Certificate Data Sheet. The group, however, noted that the aircraft owner may know if the aircraft's icing equipment is certified for Flight Into Known Icing or its icing equipment is advisory in nature only.

Tetra Tech provided a summary of the results of the 2012-2015 GA survey responses to Q16 and Q16A which is shown in the following table.

		2015	2014	2013	2012
Q16	No	8187	8556	8480	8539
	Yes	10490	10962	11470	11262
	Missing	876	887	809	912
	Total	19553	20405	20759	20713

		2015	2014	2013	2012
Q16pct	No	41.9%	41.9%	40.8%	41.2%
	Yes	53.6%	53.7%	55.3%	54.4%
	Missing	4.5%	4.3%	3.9%	4.4%

Q16A. [IF YES] How was this aircraft prohibited?

		2015	2014	2013	2012
Q16a	Placard	932	732	737	806
	POH/AFM	7128	6789	7137	6819
	Both	1424	3359	3510	3478

The proposed restructured question would say:

> In 201X, was this aircraft equipped to operate in icing conditions?
> ☐ No
> ☐ No, but equipped with advisory icing equipment
> ☐ Yes, aircraft equipped for Flight Into Known Icing (FIKI)

Q19: Installed Avionics and Equipment. The survey typically includes a one-page question that asks the respondent to identify equipment that is installed on the aircraft including general equipment, transponder equipment, communications equipment, weather equipment, navigation equipment, and guidance and control equipment. Additionally, some years other equipment questions are added to

query about specific safety topics such as icing capability (*e.g.*, in 2007 the Q16 about flight into icing was updated and Q17 about ice protection equipment was added).

The group noted that the avionics data is only collected in the individual aircraft survey. The avionics question is not asked for the large fleet survey because it would be impractical and remove the efficiencies obtained from the fleet survey if those respondents were asked to identify aircraft equipage. The large fleet survey was introduced approximately 10 years ago and significantly improved response rates. Tetra Tech noted that approximately 68.6 percent of aircraft responses are based on the single aircraft survey form in 2015, while 31.4 percent of the responses are driven by the large fleet form. Tetra Tech also noted that they recently did a test to shift the criteria for receiving the "large" survey from 3 to 4 aircraft, but this negatively impacted the response rate. The group noted that asking large fleet survey respondents to identify "percent aircraft equipped" for select NextGen or other equipment may strike the balance between efficiency and obtaining useful data to inform agency policy (e.g., what percentage of your aircraft are WAAS Class 3 equipped).

Another option for the large fleet survey avionics section includes asking a limited set of questions (*e.g.*, five) each year to obtain an understanding of this fleet on a rolling basis. The group also discussed whether the make/model data could be pre-populated based on regulatory requirements for those aircraft that may have certain equipment based on regulations (*e.g.*, requirement for CVR/FDR). It was also noted that the FAA is already using the existing OpSpecs database to determine the typical fleet capability of Parts 135, 91K, and some Part 91 airplanes as shown in Appendix B.

The group noted that including "More than one" equipment in the current survey adds little value for the vast majority of questions. The only known recent use of the "more than one" option was a specific request from the NTSB to support the glass cockpit avionics study. (The "more than one data" is not published by the FAA and only available on request.) The group recommends that the option to respond with "More than one" avionics equipment should be removed, except in a case where the FAA views that there is benefit <u>for a specific question</u> to know if the aircraft has more than one piece of avionics.

The group also discussed whether the survey should include portable equipment as opposed to only installed equipment. The group separately endorsed the survey remaining aircraft-centric which would make asking questions about portable equipment difficult. The FAA may, however, consider asking about PED-interface capabilities if the agency has a safety interest in better understanding the use of portable equipment as part of avionics (*e.g.*, how many aircraft in the fleet have installed WiFi or other mechanisms to interface a Portable Electronic Device (PED) with the installed avionics).

The group was also asked if there would be benefit in shifting from equipment to certain capabilities for an aircraft. The group endorsed the survey questioning remaining focused on equipment installed on aircraft, but that the FAA may ask about "capabilities" for specific questions for which it may make more sense.

The following questions warrant further review including the following proposed changes:

- Installed General Equipment:
    - The two ELT questions can be reduced to one where the respondent can answer if they have 121.5MHz equipment and / or 406MHz equipment. (Currently, some ELTs are sold as combined.)

- The survey should ask about key safety equipment, such as Angle of Attack indicators in addition to current question about airbags and ballistic parachutes. The group recommends the question be worded for generic equipment (e.g., "stability control system (e.g., angle-of-attack)" to avoid being technology limited.
- Add a question about "engine monitoring" capability.
- Add a question about "gear advisory system" capability to address this capability for amphibious aircraft.
- The group noted that there is expanding recording capabilities in the GA fleet which the survey currently does not address. The recording questions (*i.e.*, Flight Data Recorder, Cockpit Voice Recorder, and Image Recorder) should be listed next to each other. The FAA should also consider asking about recording capability contained in an aircraft PFD / MFD and whether there is a Quick Access Recorder (QAR) on the aircraft. The proposed way to ask this in the survey would be:

Recording Equipment:

Flight Data Recorder	☐
Cockpit Voice Recorder	☐
Quick Access Recorder	☐
Cockpit Image Recorder	☐
Recording capability in PFD/MFD	☐

- Installed Transponder Equipment:
  - The survey currently asks about ADS-B out / in capability, but the FAA is separately tracking each aircraft's ADS-B equipment in a real-time manner. A review of the data obtained by the survey compared to the data obtained in real-time may introduce survey efficiencies provided that other data would be made available publicly on a regular basis.
  - The group also questioned the value of retaining the question about a Mode A transponder and the FAA's use of this information.
  - The group recommends moving the "Collision Avionics (TCAS or TCAD)" question out from the transponder section of avionics survey into the "General Equipment" section.
  - The group recommended a shorter transponder section:

Installed Transponder Equipment	
Mode 3A/C	☐
Mode 3A/C and UAT ADS-B Out (TSO C-154)	☐
Mode S (TSO-C112)	☐
Mode S (TSO-C112) and ADS-B Out (TSO-C166)	☐
ADS-B In Receive	
UAT Only	☐
1090 Only	☐
UAT-1090 Dual-Band	☐

- Communications Equipment:
  - The survey currently asks about 360 channel (50kHz channel spacing radios) which likely are not in wide use in the fleet anymore.

- The group recommends that the FAA determine if there is a benefit to understanding the differences in the fleet capability between 25kHz radios and whether they have 720 or 760 channels enabled. If not, the group recommends combining this information into a single 25kHz radio question.

- Navigation Equipment:
  - The survey currently asks about eight different types of possible GPS / WAAS equipage levels and it is likely that many owners do not understand the subtle differences in their aircraft equipage. Asking a narrower set of questions (*e.g.*, excluding the WAAS Class 2 which is not produced) and linking the question about "IFR approved" to questions about specific capability would reduce the number of questions. Additionally, asking about 100 versus 200 channel VOR receivers provides little value, but the FAA should determine if the agency is interested in the results of this question, or not.
  - The working group, in coordination with AIR-130 staff, developed an updated version of the navigation equipment section which would ask:

Installed Navigation Equipment

Global Position System Operational Capability	
Not IFR Approved	☐
IFR-approved for enroute operation only	☐
IFR-approved for en route & terminal operation only	☐
IFR-approved for non-precision (LNAV) approach operation	☐
IFR-approved for LPV approach	☐
Baro-VNAV for Enroute/Terminal	☐
Baro-VNAV for Approach Vertical Guidance	☐
Inertial Reference / Navigation System	☐
VOR/DME-based Area Navigation Equipment (RNAV)	☐
DME/DME-based Area Navigation Equipment (RNAV)	☐
DME	☐
ILS	☐
100 channel VOR receiver	☐
200 channel VOR receiver	☐
Moving map capability	☐

- Installed Guidance and Control Equipment:
  - The survey currently only asks about Enhanced Vision System (non-credit) and not about Enhanced Flight Vision Systems (credit to 100 foot) (see, AC 90-106). The questionnaire should ask about not only EVS, but also EFVS.
  - The survey should, in addition to EVS, EFVS, and SVS, also ask about "Combined Vision Systems (CVS)" which are entering into the market place.

It was also noted that the avionics questions may be possible to structure in a "logic tree" when asked online to reduce the number of questions asked to the respondents (*e.g.*, if you answer no to question 1, then you are not asked question 2). This may especially be useful for the internet version of the survey such as not asking turbojet aircraft if they have an electrical system. As an example, it has been noted that certain types of aircraft (*e.g.*, lighter-than-air) do not benefit from a lengthy avionics survey since it can be assumed that they have rater rudimentary avionics suites and could be made subject to a shorter and guided survey when answer questions online.

At one point in time the FAA only asked the avionics questions every other year. The group discussed asking avionics every year or, alternatively, asking NAV-questions one year and surveillance questions the next year.

MITRE has volunteered to provide the results of their review of the GA survey in context of other work conducted by MITRE to monitor the fleet capability in aviation including business and general aviation. It was noted that MITRE captures significant aircraft capability as part of other work done on behalf of the FAA and it was asked how this data can be better incorporated into the survey results or, alternatively, presented on a public website like the results of the GA avionics survey.

Coordination between AVP and key FAA offices (AFS-400, AIR-130, and ANG) will help inform how to structure the avionics equipment specifically.

Attached in Appendix A is an updated version of the avionics question for considerations.

Survey Output

The survey contractor produces approximately 71 Excel tables (35 of which are about avionics) that are published by the FAA on the agency's website. The group discussed the content of these tables and the following feedback was provided.

E-LSA: The output currently shows Light Sport Aircraft with two subcategories (Experimental Light Sport Aircraft and Special Light Sport Aircraft). It was noted that the "E-LSA" aircraft are mostly converted ultra-light and amateur built aircraft and may be better suited to the "Experimental" listing of aircraft. (Note – this change was implemented in the 2013 survey, which shifted E-LSA under the Experimental group of aircraft.)

Other Discussion including Input Received Between 2013 and 2016

GA Safety Metric: The group discussed the current general aviation safety metric (fatal accidents per 100,000 hours flown), which is informed by the results of the GA survey. It was noted that the GAJSC SAT has been tasked with reviewing the safety metric. This review will consider the results of the GA survey including undertaking a look at the impact of the transition of previously unregistered aircraft (which were not counted as accidents) to registered aircraft following the establishment of the current agency baseline. The SAT's review of the FAA's safety metric is expected to be completed in 2017 to support a transition to a new metric and safety goal in 2018.

Charitable Flights: The FAA was approached in 2015 about adding a "use category" to the survey for "public benefit (charitable)" flight operations to better understand operations under 14 CFR 91.146, Passenger-carrying flights for the benefit of charitable, non-profit, or community event. This regulation was amended in 2007 and is receiving increased attention from the FAA based on the requirements established for these organizations. The FAA should consider adding this use category.

Early Field Period: The group also discussed the benefit of the FAA launching the field period by February / March each year to (1) allow respondents to provide data sooner after the end of the survey year, and (2) publish the results of the survey earlier to help inform safety, forecast and other analysis of general aviation. (Note – the 2015 survey was launched February 1, 2016.)

Large Fleet Survey and Aircraft on Lease Back: The GAJSC received feedback from one operator of a larger flight school about receiving "30-40 individual surveys" as opposed to being included in the "large fleet survey" form. Further discussions with operator indicated that the operator did not own its aircraft, but instead maintained them on a lease-back relationship with the owners of the aircraft. The survey contractor has a process in place to consolidate these "lease back" aircraft into the large fleet when they learn about them on a case-by-case basis.

Manufacturer Reporting: Manufacturers conduct production flight test and other aircraft operations during a year and also receive a set of surveys based on the list of aircraft registered to the manufacturer on December 31 of the survey year. Interactions with one manufacturer in 2015 concluded that the manufacturer did not respond with the flight hours for those aircraft registered to them on December 31 of the survey year, but instead likely responded to the large fleet survey with the total flight time conducted by them during the survey year (i.e., for all aircraft produced and not just those still with the company on December 31). This initially resulted in an over-estimation of the flight hours for that type of flying which was revised prior to the publication of the results.

Year of Manufacture: The contactor has noted that problems continue with properly identifying the year of manufacture of aircraft because it is not always included in the aircraft registry database. The group discussed this well-known issue and appreciates the work of the contractor to infer years of manufacture based on serial number of the aircraft and sources such as Aircraft Bluebook that may help further populate this data field.

The avionics results by themselves include over 30 tables produced. The FAA, working with Tetra Tech and stakeholders, should review the existing avionics report templates and consolidating them into a simpler and more easily understood set of tables (*e.g.*, the tables by state and primary use for avionics likely have limited benefit).

Appendix A – Updated Installed Avionics and Equipment Survey

Installed General Equipment

- Electrical System ☐
- Electronic Primary Flight Display (PFD) ☐
- Multi-Function Display (MFD) ☐
- Electronic Flight Bag (EFB) – Installed ☐
- Terrain Awareness Warning System (TAWS) ☐
- Collision Avoidance (TCAS, TCAD, TIS) ☐
- Emergency Locator Transmitter: 121.5 ☐ and / or 406 ☐
- Air Bag ☐
- Ballistic Parachute ☐
- Angle of Attack Display ☐
- Flight Envelope Protection ☐
- Electronic Engine Monitor ☐

Installed Transponder Equipment

- Mode 3A/C ☐
- Mode 3A/C and UAT ADS-B Out (TSO C-154) ☐
- Mode S (TSO-C112) ☐
- Mode S (TSO-C112) and ADS-B Out (TSO-C166) ☐
- ADS-B In Receive
  - UAT Only ☐
  - 1090 Only ☐
  - UAT-1090 Dual-Band ☐

Installed Communications Equipment

- 50 kHz radio (360 channel) ☐
- 25 kHz radio (720 channel) ☐
- 8.33 kHz radio (2280 channel) ☐
- HF radio ☐
- Datalink:
  - SATCOM (Comsat, Inmarsat) ☐
  - ACARS (AFIS) ☐
  - FANS (1/A) ☐

Installed Weather Equipment

- Airborne Weather Radar ☐
- Data Link Flight Information (UAT, XM, WSI) ☐
- Lightning Detection Equipment ☐

Recording Equipment

- Flight Data Recorder ☐
- Cockpit Voice Recorder ☐
- Quick Access Recorder ☐
- Cockpit Image Recorder ☐
- Recording capability in PFD/MFD (SD card) ☐

Installed Navigation Equipment

- Global Position System Operational Capability
  - Not IFR Approved ☐
  - IFR-approved for enroute operation only ☐
  - IFR-approved for enroute & terminal operation only ☐
  - IFR-approved for non-precision (LNAV) approach operation ☐
  - IFR-approved for LPV approach ☐
- Baro-VNAV for Enroute/Terminal ☐
- Baro-VNAV for Approach Vertical Guidance ☐
- Inertial Reference / Navigation System ☐
- VOR/DME-based Area Navigation Equipment RNAV) ☐
- DME/DME-based Area Navigation Equipment (RNAV) ☐
- DME ☐
- ILS ☐
- 100 channel VOR receiver ☐
- 200 channel VOR receiver ☐
- Moving map capability ☐

Installed Guidance and Control Equipment

- Flight Management System ☐
- Flight Director ☐
- Autopilot-Axis Control:
  - Lateral Guidance ☐
  - Approach Model (vertical guidance) ☐
- Horizontal Situation Indicator (HIS) ☐
- Heads Up Display ☐
- Enhanced Vision System (EVS) ☐
- Enhanced Flight Vision System (EFVS) ☐
- Synthetic Vision System (SVS) ☐
- Combined Vision System (CVS) ☐

Appendix B – Equipment Relevant OpSpecs by Regulatory Part

The following is an annotated listing of the OpSpec types which have a bearing on the topical areas of the Survey (organized according to which FAR Part the OpSpec are applicable to). Only document types ("Part Para") that are specifically in regard to Installed Avionics Equipment are shown in blue. Documents types relevant to other aspects of the survey are highlighted in olive.

14 CFR Part 135

	CFR	Part Para	Active Documents	Title
17	135	A019	0	Automotive Gasoline as Aircraft Fuel
19	135	A021	76	Helicopter Emergency Medical Services (HEMS) Operations
21	135	A023	133	Authorization to Use an Approved Procedure for Determining Operations During Ground Icing Conditions
22	135	A024	207	Air Ambulance Operations-Airplane
25	135	A028	3	Aircraft Wet Lease Arrangements
26	135	A029	0	Aircraft Interchange Agreements
31	135	A037	2	Basic 14 CFR Part 135 Operator - Commuter and On-Demand Operations
32	135	A038	313	Basic 14 CFR Part 135 Operator - On-Demand Operations Only
36	135	A042	700	Authorization for 14 CFR Part 135 Aircraft Operations Without a Deicing/Anti-icing Procedure
38	135	A050	40	Helicopter Night Vision Goggle Operations (HNVGO)
40	135	A056	14	Data Link Communications
42	135	A061	306	Use of Electronic Flight Bag
51	135	A353	1	Automatic Dependent Surveillance-Broadcast (ADS-B) Operations Outside of U.S.-Designated Airspace
52	135	A354	0	In-Trail Procedures (ITP) using ADS-B IN
60	135	A530	0	Special Federal Aviation Regulation (SFAR) No. 77 Approval for Operations Conducted Under Contract to U.S. Transportation Command or Air Mobility Command

61	135	A532	1	Special Federal Aviation Regulation (SFAR) No. 112 Approval for Operations Conducted Under Agreement with a U.S. Government Agency
64	135	B030	23	IFR Navigation Using GPS/WAAS RNAV Systems
65	135	B031	2113	Areas of En Route Operation
67	135	B034	1083	IFR Class I En Route Navigation Using Area Navigation Systems
68	135	B035	791	Class I Navigation in the U.S. Class A Airspace Using Area or Long-Range Navigation Systems
69	135	B036	320	Class II Navigation Using Multiple Long-Range Navigation Systems (LRNS)
75	135	B046	553	Operations in Reduced Vertical Separation Minimum (RVSM) Airspace
76	135	B048	15	Air Tour Operations Below 1,500 Feet AGL in the State of Hawaii
77	135	B049	14	Operations in the Grand Canyon National Park Special Flight Rules Area (GCNP-SFRA)
78	135	B050	2114	Authorized Areas of En Route Operations, Limitations, and Provisions
79	135	B054	197	Class II Navigation Using Single Long-Range Navigation System (S-LRNS)
80	135	B057	50	National Parks Air Tour Management Operations-Under 14 CFR Part 136
85	135	C048	10	Enhanced Flight Vision Systems
88	135	C052	1217	Straight-in Non-Precision, APV, and Category I Precision Approach and Landing Minima – All Airports
93	135	C059	1	Category II Instrument Approach and Landing Operations
94	135	C060	1	Category III Instrument Approach and Landing Operations
95	135	C061	0	Flight Control Guidance Systems for Automatic Landing Operations Other Than Categories II and III
96	135	C062	3	Manually Flown Flight Control Guidance System Certified for Landing Operations Other Than Categories II and III
97	135	C063	446	Area Navigation (RNAV) and Required Navigation Performance (RNP) Terminal Operations
102	135	C070	44	Airports Authorized for Scheduled Operations

105	135	C073	248	Vertical Navigation (VNAV) Instrument Approach Procedures (IAP) Using Minimum Descent Altitude (MDA) as a Decision Altitude (DA)/Decision Height (DH)
115	135	C384	4	Required Navigation Performance (RNP) Procedures With Authorization Required (AR)
128	135	D085	2112	Aircraft Listing
135	135	D093	41	Helicopter Night Vision Goggle Operations (HNVGO) Maintenance Program
156	135	H112	42	Instrument Approach Operations Using an Area Navigation System

14 CFR Part 91K

	CFR	Part Para	Active Documents	Title
19	91K	A056	1	Data Link Communications
22	91K	A061	7	Use of Electronic Flight Bag
28	91K	A353	1	Automatic Dependent Surveillance-Broadcast (ADS-B) Operations Outside of U.S.-Designated Airspace
29	91K	A354	0	In-Trail Procedures (ITP) using ADS-B IN (REQUIRES HEADQUARTERS APPROVAL)
32	91K	B030	0	IFR Navigation Using GPS/WAAS RNAV Systems
33	91K	B031	9	IFR En Route Limitations and Provisions
34	91K	B034	9	IFR Class I En Route Navigation Using Area Navigation Systems
35	91K	B035	9	Class I Navigation in the U.S. Class A Airspace Using Area or Long-Range Navigation Systems
36	91K	B036	6	Class II Navigation Using Multiple Long-Range Navigation Systems (LRNS)
42	91K	B050	9	Authorized Areas of En Route Operations, Limitations, and Provisions
43	91K	B054	6	Class II Navigation Using Single Long-Range Navigation System (S-LRNS)
47	91K	C048	1	Enhanced Flight Vision Systems

50	91K	C052	9	Straight-in Non-Precision, APV, and Category I Precision Approach and Landing Minima – All Airports
53	91K	C059	0	Category II Instrument Approach and Landing Operations
54	91K	C060	0	Category III Instrument Approach and Landing Operations
55	91K	C061	0	Flight Control Guidance Systems for Automatic Landing Operations Other Than Categories II and III
56	91K	C062	0	Manually Flown Flight Control Guidance System Certified for Landing Operations Other Than Categories II and III
57	91K	C063	8	Area Navigation (RNAV) and Required Navigation Performance (RNP) Terminal Operations
58	91K	C073	4	Vertical Navigation (VNAV) Instrument Approach Procedures (IAP) Using Minimum Descent Altitude (MDA) as a Decision Altitude (DA)/Decision Height (DH)
64	91K	C384	1	Required Navigation Performance (RNP) Procedures With Authorization Required (AR)
69	91K	D085	9	Aircraft Listing
78	91K	H101	0	Terminal Instrument Procedures - Helicopter
79	91K	H102	0	Basic Instrument Approach Procedure Authorizations - All Airports
88	91K	H112	0	Instrument Approach Operations Using an Area Navigation System

14 CFR Part 091

	CFR	Part Para	Active Documents	Title
7	091	A056	161	Data Link Communications
11	091	A353	4	Automatic Dependent Surveillance-Broadcast (ADS-B) Operations Outside of U.S.-Designated Airspace
12	091	A354	0	In-Trail Procedures (ITP) using ADS-B IN (REQUIRES HEADQUARTERS APPROVAL)
13	091	A510	7	Special Flight Authorization (SFA) for Ferry Flights
14	091	A511	23	Special Flight Authorization (SFA) for Sales Demonstration Flights

15	091	A512	3	Special Flight Authorization (SFA) for Training Flights
18	091	A532	0	Special Federal Aviation Regulation (SFAR) No. 112 Approval for Operations Conducted Under Agreement with a U.S. Government Agency
19	091	B034	2294	Navigation Equipment Eligibility to Operate in Terminal and En Route Airspace Designated as P-RNAV and/or B-RNAV/RNAV 5 Airspace
20	091	B036	3006	Operations in Required Navigation Performance Airspace
23	091	B050	15	Special Authorizations for Certain Areas of Operations
24	091	B054	37	Class II Operations in Airspace Where RNP 10 Is Applied Using a Single Long-Range Navigation System (S-LRNS)
25	091	B057	8	National Parks Air Tour Management Operations-Under 14 CFR Part 136
28	091	C059	19	Category II Instrument Approach and Landing Operations
29	091	C060	3	Category III Instrument Approach and Landing Operations
30	091	C063	72	Area Navigation (RNAV) and Required Navigation Performance (RNP) Terminal Operations
34	091	C384	22	Required Navigation Performance (RNP) Procedures With Authorization Required (AR)

Appendix C – Meeting Agenda

AGENDA
GA Survey Stakeholder Meeting
Thursday, May 26, 2016
GAMA | 1400 K Street, NW Suite 801 | Washington, DC, 20005 | 202-393-1500

Time	Agenda Item
9:00	Welcome and Introductions (All)
9:10-9:20	Presentation: GA Survey Review and Update (Tetra Tech) - Overview of the survey - Updates since last stakeholder review - Avionics and the GA Survey
9:20-9:45	Discussion: What is the measurement objective for survey data on avionics? - Equipment versus capabilities - Continue to emphasize *installed* equipment?
9:45-10:15	Discussion: What avionics items can be eliminated? - Not current technology, not usefully informing safety analysis/policy - One of an item vs. more than one
10:15-10:45	Discussion: What avionics items need to be added or modified? - Update to reflect current technology or use - What data is needed to support safety analysis and assessment of policy?
10:45-11:00	Discussion: How frequently should the survey collect avionics data? - Every year, every other year, rolling subsets over 3 year period?
11:00-11:30	Discussion: What avionics can we gather from fleets? - What are the highest priority items? - What level of granularity is necessary? - Alternate data sources?
11:30-11:45	Next steps: - Who else should be consulted to meet data end-user needs?
11:45	Closing Discussion
Noon	Adjourn

Appendix D – GA Survey Statistical Confidence 2010