

**Clearance Record
DOCUMENT COMMENT LOG**

Originating Office: AIR-100	Document Description: MEMO AIR100-14-110-PM01	Project Lead: AIR-100/ AIR-200	Reviewing Office: AIR-100/ AIR-200	Date of Review: 2-4-14
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Company & Group	Page & Paragraph	Comment	Rationale for Comment	Recommendation	Disposition
Note: The ASTM F3011-13 standard was accepted by Small Airplane Directorate (ACE-100) as the standard for Angle of Attack (AoA) approval.					
E. Kolano, ANM-160S, (425) 917-6519	General	We agree that the inclusion of an AoA system may aid in preventing loss of control accidents and understand the desire to streamline design and production approval of these systems. However, we are concerned that suggested changes below should be made to insure that the installed AoA system truly performs its intended function and does not introduce unanticipated safety risks.			Concur – not adopted. Good comment This is the reason why we want to start with this “Pilot Program” to evaluate the effectiveness of AoA in service versus a “safety enhancing” claim without substantive data to support it.
T. Vranna, ANM-108, (425) 227-2128	Page 1, Paragraph 2	“This memo applies only to supplemental AoA system(s)...” By installing additional, non-type certificated systems; it could create confusion for the pilot during critical phases of flight.	By having multiple AoA systems in the airplane, events could arise where instrumentation is conflicting. There may not be a safety benefit for the installation of this system. Actually, safety could be compromised.	Reword the document.	Concur – not adopted. We believe the commentator meant to say two AOA system (one AOA and the other Stall Warning system in the same aircraft) Good comment. The conflicting information is also our primary concern. We are hoping that AOA will give pre-warning to the Stall warning system, not conflicting information Further, if there is an existing certificated AoA in the aircraft, there is no need for an additional AoA?

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<p>ACE-117C Flight Test,</p> <p>William Jaconetti, 847-294-7161</p>	<p>Page 1, Paragraph 2.</p>	<p>Without AoA indicators properly integrated with pilot training, the value of these types of systems is significantly diminished.</p>	<p>Adding a piece of data for the pilot (AoA) that has not been correlated with his/her training will not enhance safety and could create conflicting information or difficulty in interpretation.</p> <p>AoA is standard for flying within the limits of military fighter aircraft because AoA is used throughout the flight regime. Adding one display of AoA without any correlation during each flight regime will have limited benefit to pilots. Current GA aircraft and training programs are “airspeed” vs. AoA centric.</p>	<p>Create changes to approved training curricula and practical test standards that talk to a more AoA-centric approach to flying.</p> <p>Roll-out parts changes along with a shift in training to AoA that goes beyond just discussion of stall (we already have that).</p>	<p>Not adopted:</p> <p>Good comment</p> <p>This topic has been mentioned and discussed in detail.</p> <p>This specific issue has been raised. This is the reason why we want to start with this “Pilot Program” to evaluate the effectiveness of AoA in service versus a “safety enhancing” claim without substantive data to support it.</p> <p>Please see above disposition also. We put a 3 year expiration date to re-evaluate our position.</p>
<p>ACE-117C,</p> <p>Roy Boffo, 847-294-7564</p>	<p>Page 1, Paragraph 2</p>	<p>Editorial</p>	<p>General Aviation should be spelled out.</p>	<p>Spell it out and put (GA).</p>	<p>Adopted.</p>
<p>E. Kolano, ANM-160S, (425) 917-6519</p>	<p>Page 2, Paragraph 2</p>	<p>Qualitative evaluation of design only required.</p>	<p>A review of the design may not sufficiently address the stated intent of the review, namely, to ensure the system’s operation or failure will not affect flight safety or pilot workload.</p>	<p>Specify an appropriate means of assessing whether the system’s operation and failure may affect flight safety or pilot workload. This requires some level of an aircraft flight test.</p>	<p>Acknowledged:</p> <p>This is a non-required equipment and provides supplemental information only. The general statement in design requirements (2.a) is sufficient for part approval. The installation evaluation is beyond the scope of this memo and it is the installer’s responsibility to determine its suitability of installation.</p> <p>This point has been brought up during the technology</p>

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					board meeting and they have pointed out that the installer is educated and knowledgeable enough to make this determination during installation.
ACE-117C Flight Test, Ron McElroy, 847-294-8195	Page 1, 2 nd para.	2 nd sentence requires substantiation about the safety benefits of the AoA system to prevent loss of control.	Although there are legitimate safety arguments to support AoA in aircraft, the operational advantages and procedural use of the AoA system requires a thorough understanding and specific training for the pilot to also mitigate misuse. Consider additional explanation or definition of how the AoA “may” aid in preventing loss of control accidents.		Acknowledged: Good comment Part 21.8 (d) deals with design and production approval. The commentator is focusing on operational side which is outside the scope of this memo. The commentator is correct in their assessment. We have considered the risk of the stated concern. Thus, our initial approach is to allow installation of these non-required types of equipment to measure its risk versus its potential benefit. Once we establish its effectiveness, we will make a decision whether to expand the scope to other similar equipment or increase the level of certification oversight to ensure the level of safety is not diminished.
ACE-116W, Paul DeVore	Page 2, Section 2.	Is the intent that the failure of this type of equipment has no effect or only a minor effect on the safety of the aircraft?	If not, approval at the installation level would appear to be problematic if an applicant for an STC or TC proposes to include this system in their type design.	If so, this should be clearly stated.	Explanation: “A <i>failure of the AoA system to perform its intended function or display erroneous indications must not adversely affect the safety of the aircraft, its</i>

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					<p><i>occupants, or the proper functioning of equipment and systems that are required by the airworthiness standards or operating rules.”</i></p> <p>It is clearly stated in the Memo.</p> <p>If a minor failure does not adversely affect the aircraft then it is allowed.</p>
ACE-116W, Paul DeVore	Page 2, Section 2	Under AOA design requirements, the manufacturer is required to perform a qualitative evaluation regarding safety of the airplane and pilot workload. How will the manufacturer be able to perform this, not knowing what particular airplane the system will be installed on?	There may be differing safety effects, depending on if the unit is installed on a high performance or low performance airplane, etc. If the FAA is making a predetermined assessment that this type of equipment, installed with the limitations of this memo, have no safety effect, then there appears to be no reason to have the manufacturer do an evaluation of the installed effects.	Suggest eliminating the requirement.	<p>Explanation:</p> <p>This is a two part question, Some responsibilities fall on the manufacturer and some fall on the installer to determine suitability. This is the same approach used for TSO articles. The TSO applicant complies with certain TSO requirements regardless of what type of aircraft the article is installed. This memo establishes minimum requirements for the applicant to consider before seeking approval. Without any requirement would result in many variety of equipment with different design approaches which could potentially pose a safety hazard to the aircraft. At minimum our aim is to keep the current safety standard and potentially improve it with this equipment. Without any</p>

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					imposed requirement, the current safety standard could be jeopardized
ACE-117C, Brenda Ocker, 847-294-7126	Pg. 2, Para. 2, AoA Design Requirements	The failure condition classification should be explicitly defined for both loss of function and misleading information.	It is not clear that “must not adversely affect” is equivalent to “no safety effect”. Also, misleading information is general more severe than loss of function and could be interpreted as a “minor” or even “major”, in this case.	Clarify. If the failure condition classification is more severe than “no safety effect”, guidance such as AC20-115C and AC20-152 would apply.	Not Adopted, This is not a required equipment to impose loss of functionality. Only misleading information. We don't care if it fails. The pilot is not supposed to use it as a primary instrument, only to supplement the information he is receiving from his primary instrument.
ACE-117W Baker	Page 2. Section 2. AoA Design Requirements – Para 1.	Under AoA Design Requirements, a "qualitative" evaluation of the design is required to determine that normal operations or failure will not affect safety of the airplane or pilot workload. More specific requirements describing the required "qualitative" evaluation should be included.			Not adopted The ASTM does not define the difference between simple and complex AoA. This creates a potential for two types of approvals. The intent is not to create a stringent evaluation requirement if the AoA design is simple and non-complicated. It is prudent to allow the applicant to propose their approach for qualitative assessment, rather than mandating specific requirement.

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ACE-117C Flight Test, Ron McElroy, 847-294-8195	Page 2, 1 st para., Applicability	Editorial	3 rd sentence repeats content of 1 st sentence. Duplication.	Delete 3 rd sentence.	Adopted
ACE	Page 2, para. 1.a(3)	Editorial. Sample statement of compliance mixes subject and verb	“We” is the subject of the sentence, but then the sentence goes on to say “and is produced in accordance with...”	Revise to say, “..., and that the article is produced in accordance with...”	Adopted
ACE-116W, Paul DeVore	Page 2, Section 2, first paragraph	Editorial. The first sentence is awkwardly worded.		In the first sentence, change “display erroneous” to “erroneous display.”	Not adopted. Does not add or take away from the meaning of the sentence.
ACE	Page 3, para 1-8	Some of the requirements could be combined; there is duplication in places	Example: items (2) and (4) include some duplication. Can these be combined and streamlined? Similar situation with (8) and the second occurrence of (2).	Consider combining and streamlining the requirements.	Not adopted. Item 2- refers to calibration of AoA in relationship with stall warning system. Item 4- refers to AoA system installed without existing stall warning
ACE	Page 3, para 1-8	Item numbers are reused, causing confusion	There are three different items labeled as (1); three labeled as (2), and so on.	Introduce a numbering system that results in each requirement having a unique label.	revised
T. Vrana, ANM-108, (425) 227-2128	Page 1, Paragraph 1	The memo states in part, “This memorandum establishes requirements and procedures...”	FAA Order 8100.6 outlines the proper use of memorandums. We believe this should be a policy statement per 8100.6.	Clarify that this memo outlines a method under part 21 to establish means to install AoA systems.	The memo outlines approval of the design and production, not installation. The provisions are part of installation instructions which would fall under type

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					design. This memo will be converted in to an Order or an AC in the near future.
T. Vranna, ANM-108, (425) 227-2128	Page 4, Paragraph 3	To control the quality means the AoA system manufacturer must build the article in accordance with its approved design. This also means that each design change to the article or any of its components features or functions is controlled by the manufacturer.	There is no means to ensure that design changes, follow for installations. There is also no means of reporting failures to the manufacturer as required by 21.137. Also, there is no means of compliance to the requirements 21.50 instructions for continued airworthiness.	Clarify that this memo outlines a method under part 21 to establish means to install AoA systems.	Non-concur There is a requirement for in-service feedback. The ASTM standard specifies the requirements for ICA.
T. Vranna, ANM-108, (425) 227-2128	Page 4, Paragraph 3	“Applicants who do not hold a part 21 production approval must declare that their quality system meets the requirements of 14 CFR 21.137.” This statement implies that production approval is not required and the self-declaration of a quality system to 21.137 is all that is required.	Does this mean that this quality system will not be evaluated and/or approved by competent authority?	Clarify that this memo outlines a method under part 21 to establish means to install AoA systems.	Revised memo and clarified the stated concern.
T. Vranna, ANM-108, (425) 227-2128	Page 2, Paragraph 1.a.(3)	“A statement of compliance certifying that the applicant’s article meets the design requirements of ASTM F3011-13, and the applicant has met the requirements of this memo...” Again, a memo isn’t the method of establishing industry requirements.	FAA Order 8100.16 outlines the proper use of memorandums. We believe this should be a policy statement per 8100.16.	Please do not issue these requirements as a “memo.”	Acknowledged: The memo will be converted into an Order after the expiration date. Initially, we want to use it as the “pilot program” for implementation, and then fine tune the process before releasing an Order.
ACE-116W, Paul DeVore	General	A companion order may need to be written to administer this process similar to how we do the TSO process.	This is similar to the content of FAA Order 8150.1() for TSO’s.	Consider writing a companion order to administer the process.	See above disposition

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T. Vranna, ANM-108, (425) 227-2128	General	Why wasn't a Technical Standard order (TSO) developed?	FAA Order 8150.1C, Chapter 2 addresses the development of the TSO program. Based on review of the draft documents, this appears to be similar to TSO authorization process.	Develop a minimum performance standard via Technical Standard Order for standardization.	There is a TSO available for required AoA systems. The ASTM F3011-13 standard was accepted by Small Airplane Directorate (ACE-100) as the standard non-required for Angle of Attack (AoA) approval.
T. Vranna, ANM-108, (425) 227-2128	Page 1, Paragraph 1	The memo leads one to believe the APPLICANT is seeking a letter of approval, in paragraph 2 there are multiple ACO disclaimers, yet in paragraph 3, the APPLICANT is REQUIRED to control both the design and quality of the article. To control the quality means the AoA system manufacturer must build the article in accordance with its APPROVED design.	Lacks clarity.	Need to better clarify roles for both the FAA and applicant.	The commentator is not clear What disclaimer in paragraph 2? Applicant sends a request for approval stating that they have met the requirements of the Policy Memo and the ASTM standard. The FAA reviews the submitted document and issues the design/production approval.
T. Vranna, ANM-108, (425) 227-2128	Page 4, Paragraph 3	"Applicants who do not hold a part 21 production approval must declare that their quality system meets the requirements of 14 CFR 21.137." Does the organization have to apply for FAA production authority?	This statement leads to a lot of questions. Who ensures their quality system is sufficient? Will it be the geographic MIDO's responsibility to evaluate the quality system? How is the MIDO aware of the organization? Without any FAA oversight, is the plan to allow the manufacturing to occur unmonitored?	Clarify roles of the FAA offices involved.	The applicant must state in the application letter that their AoA system meets the design and quality control requirements of this memo. The ACO may rely on the applicant's certifying statement and issue a production approval under § 21.8(d). Provide a copy of the approval to the geographical MIDO. A MIDO audit is not required, unless there are reasons that may prompt MIDO to audit the quality control.

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T. Vranna, ANM-108, (425) 227-2128	General	The memo may be confusing. Is the applicant the design holder, the manufacturer, or the operator of the aircraft? Could they all be one in the same?	Lack of clarity.	Clarify roles for the applicant.	The first line of the memo clearly specifies this applies to the manufacturer.
T. Vranna, ANM-108, (425) 227-2128	General	Language consistency: letter of approval, vs. approved design, there are differences in aligning this language with the CFR, who, if any, maintains the COS responsibilities for the manufacture of a part that is not type approved?	Lack of clarity.	Clarify the language for roles that the FAA and applicant must perform.	adopted
ACE-117C Flight Test, Ron McElroy, 847-294-8195	Page 2, para 1.a.(2).	Insufficient listing of elements required to be provided by applicant.	Consider addition of more detailed information to support the application.	Add items such as demonstration of system operation, System Safety Assessment, AFMS, functionality/procedures for use, photos, dimensions, placards, etc.	Acknowledged, partially adopted. All of the certification items were considered, and some are still applicable. For example: if the applicant proposes a complex AoA, which requires integration with the aircraft system, they are required to provide all the hazard analysis. We also added additional requirements to the ASTM standard to ensure certain safety objectives are met. But the aim is to keep the cost of certification down to allow more people willing to invest in installing AoA on their aircraft.

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ACE-116W, Paul DeVore	Page 2, Section 1. – Applicant Responsibilities.	There is no requirement in “Applicant Responsibilities” to report failures, malfunctions or defects relating to articles produced in accordance with this policy memorandum.	The FAA needs to be kept apprised of any reportable occurrences in order to provide COS oversight of AOA installations.	Add a requirement under “Applicant Responsibilities” to report to the FAA any failure, malfunction or defect relating to articles produced in accordance with the policy memorandum in accordance with the provisions of 14 CFR 21.3.	The memo requires the quality system to include in-service feedback.
ACE-116W, Paul DeVore	Page 2	There should be a requirement that the manufacturer holding an approval under this memorandum must allow the FAA to inspect its quality system, facilities, technical data, and any manufactured articles.	This is similar to requirements for PMA’s and TSO’s. This allows the FAA to perform surveillance of the manufacturer as needed.	Under Applicant’s Responsibilities, add a requirement as noted in the comment.	Adopted
ACE-117C, Roy Boffo, 847-294-7564	Page 2, paragraph 1.a.(3) and Page 4, paragraph 3.	<p>Paragraph 1.a.(3) says that the applicant must make a statement of compliance to 14 CFR 21.137 which includes a quality manual per 14 CFR 21.138.</p> <p>Paragraph 3. Seems to approve a production system for applicants that do not have an approved quality system to support a production certificate. This is done without any MIDO/MISO involvement.</p>	Evaluation of the quality system and quality manual is usually handled by the geographic MIDO/MISO with coordination of the geographic ACO. Some companies have more production capabilities than others. Just because a company has an approved production system doesn’t mean they can produce anything/everything.	<p>Review by the geographic MIDO/MISO should take place.</p> <p>Also, their quality manual should get approved by the MIDO/MISO.</p>	Not adopted Revised memo and clarified the roles and responsibilities.
ACE-116W, Paul DeVore	Page 2	Any changes of company’s name, address or ownership should be approved by the FAA.	This is similar to requirements for PMA’s and TSO’s.	Under Applicant Responsibilities, require that any changes of manufacturer’s name, address or ownership must be approved by	Partially adopted. They must notify us of a change, we do not approve the change.

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				the FAA prior to implementation.	
ACE-116W, Riddle	General	The memo states that the system installation can be approved as a minor alteration or as a field approval.	This statement is contradictory. If the installation is a minor alteration then a field approval is not needed.		The statement is correct. The installation can be either a minor alteration or field approval. If the aircraft was altered by STC, then the AoA would be approved during the STC process, and a 21.8 approval would not be necessary.
E. Kolano, ANM-160S (425) 917-6519	Page 2, Paragraph 2	Qualitative evaluation requirement evaluation of pilot workload and potential flightcrew impacts of failures are complex, and require training and experience.	The memo states a qualitative evaluation is required but it does not specify who can perform this evaluation. It does not specify any documentation regarding the outcome of this evaluation or whether any evaluation plan or results must be retained or submitted to the FAA.	Clarify. Recommend specifying that qualitative evaluation must be accomplished as installed at the aircraft level. Additionally, specify who is considered qualified to conduct the evaluation (i.e., FAA flight test pilot or DER, company flight test pilot, ASI, etc.)	Acknowledged: This is a non-required equipment and provides supplemental information only. The general statement in design requirements (2.a) is sufficient for part approval. The installation evaluation is beyond the scope of this memo and it is the installer's responsibility to determine its suitability of installation.
ACE-114	General	The process being proposed forces a level of FAA approval and involvement that is nearly the same as a TSO/STC, yet is potentially confusing to the ACO/FSDO since it is not a "normal" TSO/PMA etc.	The data package being submitted to the ACO and the level of FAA involvement is the same as a typical STC and may lead to confusion regarding what the ACO is intended to do.	The process is currently not relieving, in that approved data (AFM) and a coordinated field approval (placard) will be required for all installations. This is contradictory to the	Adopted Revised and removed AFM requirement. Explanation: The ASTM does not define the difference between simple or complex AoA. This creates a potential for two types of approvals. One approval could be done

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				<p>declaration systems may be installed as a minor alteration. Change the memo to be consistent with the intent to streamline AOA installs.</p>	<p>under minor alteration, while a complex system may require further data submittal elevating it to a field approval.</p>
<p>ACE-117C Flight Test, William Jaconetti, 847-294- 7161</p>	<p>Page 3, Section 2, paragraph (7).</p>	<p>Is there any requirement for a flight manual supplement or pilot's guide with these units?</p>	<p>The only reference I see is in this paragraph which states that a short note be added to the flight manual after installation.</p>	<p>Recommend adding a requirement for some type of pilots guide that gives detailed explanation of how these systems work, what their limits are, etc.</p>	<p>Explanation: There is no requirement for flight manual supplement for this article as part of the approval. The installation and operation manual mentioned in the ASTM, will provide "How to operate" the AoA.</p>
<p>ACE</p>	<p>Page 3, para (7)</p>	<p>AFM requirement seems beyond scope of this simplified procedure</p>	<p>Intended scope is for simple systems that can be installed as a minor alteration.</p> <p>Also, many of the legacy airplanes targeted for simple AOA retrofit don't have a flight manual and aren't required to.</p>	<p>Remove requirement.</p>	<p>Adopted Removed requirement</p>
<p>ACE-114</p>	<p>General</p>	<p>Both the AFM supplement and the placard require approved data. Requiring them both is redundant. The placard can be done easier than the AFM supplement, since the AFM requires ACO coordination.</p>	<p>Approval of the AFM requires ACO coordination, and the placard requires a coordinated field approval. Both seem to be overkill for the criticality of this system. A pilot user guide is enough to communicate safe use and limitations.</p>	<p>Remove the requirement for AFM. It is not required equipment, so an AFM is not needed. The placard is also overkill since the pilot user guide can clearly communicate intent.</p>	<p>Adopted: Revised the policy memo and removed Flight manual approval.</p>
<p>E. Kolano, ANM-160S (425) 917- 6519</p>	<p>Page 2, Paragraph 1.a</p>	<p>Reference to Chicago ACO as LOA recipient.</p>	<p>Unless the intent is that Chicago ACO will handle all LOAs from all regions, the cognizant ACO should be reflected here.</p>	<p>Correct as necessary.</p>	<p>The Chicago ACO will process all requests under this policy. Please see above disposition for reason.</p>

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ACE-114	General	The ACO is going to be asked to issue a letter to the applicant. They are intended to use the template in the memo. However, the last paragraph does not make the intent/expectation clear.	The Chicago ACO will need to be made aware of their responsibilities for issuing a production letter to the applicant, based on the template. The letter should also clarify the level of systems engineering involvement, since the ACO will automatically treat this approval with the typical level of 23.1309 rigor.	Clarify the steps intended to be followed by the ACO to avoid confusion.	Acknowledged: Revised the memo accordingly.
ACE-117W Baker	General	Why are all applications going through the Chicago ACO? If the requirements are well documented, any ACO should be able to approve the manufacturer applications.			Explanation: The decision for routing this particular approval to Chicago ACO was made by the ACE-100 and AIR-100 managers.
ANM-100L	Page 1, Introduction	In part, states that “all applications for AoA approval will be directed to the Chicago Aircraft Certification Office, Des Plaines, IL”. 1. Does this include field approval requests? 2. Although under Applicability states that this excludes commuter and transport category airplanes, it is not restricted in this paragraph.	1. It is conceivable that the FSDOs will request engineering support from the geographic ACO (such as technical assistance or approval of AFMS). Do we refer the applicants to the Chicago ACO? As written, we would. 2. All applications - does it mean what it says, regardless whether they meet the applicability?	Please clarify the text on the first page so that the reader does not have to review the Applicability to understand the limitations of this memo.	We clarified that there is no AFMS requirements. You are correct that all requests for this approval should be referred to the Chicago ACO.
ANM-100L	Page 3, Section 2 (7) and Section 2 (8)(1)	Section requires the installation to have a statement in the AFMS and Section 8 mentions field approval. What isn't clear is who will approve the AFMS?	If it's not clear that the FSDO inspector can approve the AFMS, then the ACOs will be contacted for AFMS approval .	Put in statement that FSDOs can approve the AFMS without ACO involvement.	Removed AFMS requirement.
ACE-114	General	Why was Chicago chosen as the office for coordination and approval of the memos? Was there coordination with them so they understand their responsibility and our intent?	Coordination with the Small Airplane Directorate should be required for standardization of the intent behind the policy/process. We have been the lead on this effort and need to maintain involvement.	Change the memo to require coordination from the ACO to the Small Airplane Directorate for approval of new AOA systems to avoid	Explanation: The decision for routing this particular approval to Chicago ACO was made by the ACE-100 and AIR-100 managers.

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				confusion at the ACO level.	<p>Further, the aim is to</p> <ul style="list-style-type: none"> a. maintain consistency in implementation of the AoA approval; b. and to monitor the number of approvals to establish a database for AoA; c. Revise the process as we get feedback from the applicants quickly and efficiently. <p>Once we gain enough confidence that the process is working, we will expand the AoA approvals to other cert offices like any other approval</p>
ANM-100L	Page 5, Sample Memo	{Name of FAA ACO} – should say the Chicago ACO	Since only the Chicago ACO will receive the applications, why leave the ACO name blank (which implies other ACO can do it too)?	Specify Chicago ACO.	Adopted
ACE-119W, Hilton	General	This memo seems to be mixing the design approval and manufacturing oversight responsibilities for geographic regions. It remains unclear why Chicago is the POC for these types of installations. As described, they are non-required independent installations. The design approval methodology called out is under 21.8d which is neither a PMA or TSO, it is a method acceptable to the FAA. If this is the approach that is going to be taken, the ASTM minimum performance requirements are in the memo themselves and could be utilized by the various ACOs to determine applicant eligibility for design approval. If a SME is needed for the ASTM standards, that person could be identified. It seems to work like a pseudo TSO. It also appears to complicate the execution of sequencing type activity. I really do not see this design approval as any different than what we do today where an initial installation for an article may be in an aircraft in another region where the ACO working the equipment design approval aspects is working in parallel with the installation project ACO. The only other complication I can think of is when we work with our applicants for equipment design approvals, there are known processes and procedures in place that our offices utilizes and have worked with the applicant to develop as part of the PSP efforts. I am not sure how this would work with applicant going through a different office. Also, in some cases, an applicant could very well request a stay within region.			<p>Explanation: The decision for routing this particular approval to Chicago ACO was made by the ACE-100 and AIR-100 managers.</p> <p>Further, the aim is to</p> <ul style="list-style-type: none"> d. maintain consistency in implementation of the AoA approval; e. and to monitor the number of approvals to establish a database for AoA;

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					<p>f. Revise the process as we get feedback from the applicants quickly and efficiently.</p> <p>Once we gain enough working knowledge that the process is working, we will expand the AoA approvals to other cert offices like any other approval.</p>
<p>ACE-117C, Roy Boffo, 847-294-7564</p>	<p>Page 1, paragraph 1.</p>	<p>The Memo defines the authority to approve AoA systems per this policy memo to Chicago ACO.</p> <p>Why only Chicago?</p>	<p>Other ACO's should be able to oversee the manufacturers in their own geographic locations.</p>	<p>Change this to geographic ACO.</p>	<p>Please see disposition to commentator above.</p>
<p>ACE-117C, Roy Boffo, 847-294-7564</p>	<p>General</p>	<p>The use of 14 CFR 21.8(d) to create procedures for potentially unknown applicants with unique systems seems to be contrary to the Risk Based Analysis approach.</p>	<p>Installation of even non- required systems, depending on the system itself, may be extremely compelling to the pilot to use. The applicant's knowledge of certification procedures and human factors should be considered prior to blindly approving the system.</p>	<p>More consideration of the applicant's experience and the proposed installation should be made prior to allowing applicant only findings of compliance.</p>	<p>Acknowledged: Good comment The commentator is correct in their assessment. We have considered the risk of the stated concern. Thus, our initial approach is to allow installation of these non-required types of equipment to measure its risk versus its potential benefit. Once we establish its effectiveness, we will make a decision whether to expand the scope to other similar equipment or increase the level of certification oversight to ensure the level of safety is not diminished. This is one of the reasons why the policy memo has a 3 year</p>

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					expiration date.
ANM-100L	Page 1, Paragraph 1 and Sample Letter	The Memo states it provides procedures for issuing design and production approval for AOA indicators. However, the sample letter states it is an authorization to manufacture. The language in the memo and the sample letter should be compatible with each other and 21.8(d).	Approvals under 21.8(d) are not commonly used and the memo and the sample letter should use language that clearly and consistently state the means for the design, production and installation approval.	Change the language in the sample letter so it is clear that the letter constitutes a design and production approval. Furthermore, the sample letter should include language that states further approval is required for installation via field approval processes or as a minor alteration.	Adopted
T. Vranna, ANM-108, (425) 227-2128	Page 1, Paragraph 2	<p>“Since these systems provide only supplemental information to the pilot and are not required by regulation, the FAA has developed the following approval process under 21.8(d).”</p> <p>21.8(d) is a very general statement.</p>	If these systems or parts are not manufactured under a TSO, PMA, TC/PC, or a standard part then, they should be manufactured and approved as commercial parts as defined in 21.1. If so, they should be placed on the FAA commercial parts list and meet the required standards for these parts to include instructions for continued airworthiness per 21.50(c).	Address how this policy will comply with 21.9(a).	21.8(d) is used for cases that do fall outside the scope of our normal approval process (e.g., TSO, PMA, TC/PC). 21.8 (d) is a path way to both design approval of an article and production approval. Once the article is approved by the administrator (in any manner accepted), 21.9 is no longer prevailing. If a part is produced under a production approval, the person is in compliance with 21.9. See 21.9(a)(2) Further; commercial parts list is not set by the FAA. It

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					is set by T.C holder. ICA requirements are in the ASTM standard 4.3.6.
T. Vranna, ANM-108, (425) 227-2128	Page 4, Paragraph 3	“Applicants who hold a production approval under 14CFR part 21 may produce a supplemental AoA system under their existing quality system.” Does this mean they add the manufacturing of these articles under their current production approval? Needs to be clear if production approval needs to be obtained.	If the organization has to request production approval, they will have to meet the requirements of a PMA or TSO. For example the design must be approved and for PMA they will need to define eligibility, which is contradictory to a statement previously stated in memo.	Clarify comment.	Clarified that this is a design and production approval.
T. Vranna, ANM-108, (425) 227-2128	Page 1, Paragraph 2	“Since these systems provide only supplemental information to the pilot and are not required by regulation, the FAA has developed the following approval process under 21.8(d)”	14 CFR 21.9(a) states: “If a person knows or should know, that a replacement or modification article is reasonably likely to be installed on a type certificated product, the person may not produce that article unless it is- (1) ...Type Cert (2) ...FAA Production Approval (3) ...Standard part (4) Commercial Part	Address how this policy will comply with 21.9(a).	If a part is produced under a production approval the person is in compliance with 21.9. See 21.9(a)(2). 21.8 (d) is a path way to both design approval of an article and production approval. Once the article is approved by the administrator (in any manner accepted) 21.9 is no longer prevailing. Further, 21.9 is not explicitly mentioned in any of the current approval certificates (PMA, STC, etc). 21.9 was promulgated for unapproved parts, which in the AoA would no longer be applicable, because it is approved under 21.8(d).

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ANM-100L	Page 4, ACO Responsibilities	The statement “The ACO may rely on the applicant’s certifying statement and issue a production approval under § 21.8(d)”... is not clear.	1. Since all applications go to the Chicago ACO, shouldn’t just the Chicago ACO be mentioned here? 2. Production approval is not appropriate here, rather it should be design approval.	1. Specify Chicago ACO 2. Change to design approval or just approval under §21.8(d)	Not adopted, Already stated limited to Chicago ACO. Revised section 4, and 5 of the memo. 2. Clarified this is a design and production approval.
T. Vranna, ANM-108, (425) 227-2128	Page 4, Paragraph 4	“The ACO may rely on the applicant’s certifying statement and issue a production approval under 21.8(d).” The ACO is not typically the FAA organization that issues Production Approvals. This is normally the responsibility of the MIDO.	14 CFR Part 21 production approvals are granted by the MIDO’s, not the ACO. This memo is a deviation from current FAA processes.	Revise Memo pointing out that typically the geographical MIDO issues production approval	Revised section 4, and 5 of the memo.
ACE-117C, Roy Boffo, 847-294-7564	Page 4, paragraph 4.	ACOs do not usually issue Production approval.	Since the ACO doesn’t issue production approvals and there is no MIDO involvement, the way the Memo is written, the only real FAA involvement is the FSDO is responsible for the installation. (see paragraph 2.(8))	Consider this a minor change and have the applicant apply directly to the FSDO. The AFMS can be signed by the FSDO.	Not adopted Removed FMS requirements from the Memo, because under current practice AFMS is signed by the ACO flight test branch, which elevates the modification to a major change. This is counterintuitive to allow installation of AoA under minor alteration or field approval.
ANM-100L	Page 4, Section 4	The memo states it is the responsibility of the ACO to issue a production approval based on the applicant’s statement that they have a quality control system.	The ACO has no background or training to issue production approvals.	At a minimum, the process should require the ACO to coordinate their approval letter with the appropriate MIDO or at least notify the MIDO so the MIDO can add the company as an “approval holder” and do surveillance as req’d.	Revised memo to include providing a copy of the approval to the geographic MIDO and clarifying that a MIDO audit is not required.

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ACE-114	General	The Policy refers to 21.8 and does not address 21.9.	The whole question for the issuance of this policy was to address the unapproved part issue for production of simple AOA non-required system. The memo does not address that issue, so it will still be a problem in the field.	State the letter being issued addresses concerns in the field for unapproved parts according to 21.9 for aviation products.	Not adopted: 21.8 (d) is a path way to both design approval of an article and production approval. Once the article is approved by the administrator (in any manner accepted) 21.9 is no longer prevailing. Further, 21.9 is not explicitly mentioned in any of the current approval certificates (PMA, STC, etc). 21.9 was promulgated for unapproved parts, which in the AoA is no longer applicable because it is approved under 21.8(d). Currently, there is discussion with the AFS to update their guidance material to inform their field inspectors to recognize and accept parts that are approved under 21.8 (d).
T. Vranna, ANM-108, (425) 227-2128	General	Under §21.8(d), these parts become “FAA approved” and exclude applications on commuter and transport category aircraft. How would these parts be controlled or segregated from articles manufactured under a type certification program?	Lack of clarity.	Clarify how articles produced under the ASTM will translate to PMA approved articles.	If one of these systems were to be used on a TC, or STC project, the system would receive approval under the TC, or STC. It is no longer supplemental equipment. It becomes part of the flight instruments.

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E. Kolano, ANM-160S (425) 917-6519	General	Reference to ASTM F3011-13	This copyrighted document is available only through purchase. Asking reviewers to review the memo that relies on F3011-13 without providing F3011-13 to the reviewer significantly hampers the reviewer's ability to provide feedback.	Provide F3011-13 to reviewers.	Concur – The ASTM F3011-13 standard was accepted by Small Airplane Directorate (ACE-100) as the standard for Angle of Attack (AoA) approval
T. Vranna, ANM-108, (425) 227-2128	General	The referenced ASTM Standard is not provided with the document.	Copies of each ASTM standard should be provided for review and subsequent approval.	In the future, provide a copy of the ASTM standard with request for review and comment.	Concur.
ACE-116W, Riddle	General	This is rule making by policy memo.	This draft memo establishes the certification requirements for the AoA system shown in item 2. Has it been established by rule making procedures that ASTM F3011-13 is acceptable regulatory standards for approval of this system or any article		The policy memo provides a path to approving Angle of attack (i.e. non-required equipment) for General aviation aircraft only. Due to time constraint and urgency in installing AoAs, the ASTM F3011-13 is accepted with additional requirements that are provided in the memo. There are future plans to form a rule making committee for accepting ASTM standards for supplemental non-required equipment.
ACE-117C, Brenda Ocker, 847-294-7126	Pg. 2, Para. 1(a)(2), Applicant Responsibilities.	The applicant should also identify the software and/or airborne electronic hardware configuration.	ASTM F3011-13, Paragraph 5-5 addresses software and indicates that the software configuration shall be controlled by the manufacturer and the "revision level" made visible to the user. Therefore, the description of the article must include the software configuration information in addition to the article's part number. Although ASTM F3011-13 does not	Add the following to 1(a)(2): "If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify	Not adopted; The specific software configuration and revision level are requirements for primary airborne equipment and do not apply to non-required, supplemental equipment. Although, the applicant is

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			address airborne electronic hardware, the same comment would apply. This information is necessary to fully define the article in the initial Letter of Approval and to identify subsequent changes to the article.	the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.”	responsible to have those available in case of an audit due to reported problem, but it is not required as part of their approval submittal.
T. Dixon, ANM-100D, (303) 342-1081	Page 2, Paragraph 2	If the AOA system uses a vane, does that vane need to be heated?	Frozen vanes will give erroneous readings.	If not already required by ASTM F3011-13, add heated vane requirements for installations on aircraft certified for flight into known icing.	Not adopted. Beyond the scope of this memo
ACE-117C, Roy Boffo, 847-294-7564	Page 3, paragraph 1.a.(3).	The paragraph requires the use of ASTM F3011-13.	There are other specifications that could also be acceptable. There is a British Specification for AoA and SAE Document AS 8046.	The requirement for use of ASTM F3011-13 should be reviewed to determine if it is adequate or complete.	The ASTM standard was proposed by industry and accepted by ACE-100 management. They proposed this standard for non-required AoA design approval.
ACE-114	General	Why is there a 3 year termination?	A design approval is a design approval, so there should not be an expiration date.	We believe these types of systems to be appropriate for installation to improve safety. The memo is trying to create a streamlined process. However, a three year expiration will simply cause applicants to have to keep coming back to the FAA for approval without cause.	Explanation: The design approval once granted does not expire after 3 years. The policy memo will expire in 3 years, if not revised or extended. There are plans to either revise or convert the memo in to an Order or an AC before the expiration date.

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T. Vranna, ANM-108, (425) 227-2128	General	This memo implies that all AOA parts become "FAA approved." The language implies that the system is approved until surrendered, withdrawn or terminated.	This memo is only effective for three years.	How will this be captured in the future? If an order is appropriate, would a notice be issued now or if this is intended to be a policy statement (see previous comment), then will it be an AC?	This policy is being issued on a trial basis. If successful this policy will be incorporated into an order and an AC.
ACE-114	General	"Isolation by complex means" is not clear and seems to imply a level of system complexity beyond what was envisioned for these simple stand-alone systems.	Most systems will not interface with any other aircraft systems. It may be sufficient to say any interface to other systems must be reviewed or approved.	Clarify the scope/intent of this statement.	<p>Explanation: The ASTM does not define the difference between simple and complex AoA. This creates a potential for two types of approvals. One approval could be done under minor alteration, while a complex system may require further data submittal elevating it to a field approval.</p> <p>There can be complex AoA system that interfaces with certificated aircraft system. Some AoA use pitot static tube to operate. There are many varieties of AoA system with different complexity. By default, if the proposed AoA system is complex (i.e., objective engineering assessment) then the level of scrutiny and oversight is elevated.</p>

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ACE	Page 2, para 2.	2 nd paragraph: Does this describe a situation beyond the intended scope of this simplified process?	Complex means of isolation between the AOA and aircraft required systems may be beyond the intended scope of this simplified approval process.	Consider revising or deleting this paragraph altogether.	See above disposition
ACE-117C Flight Test, Ron McElroy, 847-294-8195	Page 2 - 2.(2) Section 2. AoA Design Requirements, para 2.	It is unclear as to the "isolation...provided by complex means."	Please clarify.	Please clarify.	Please see above disposition. Note: The level of integration in to the aircraft system requires analytical safety assessment by the applicant to ensure there is adequate system isolation between AoA and the rest of the aircraft system.
ACE-116W, Paul DeVore	Pages 2 and 3, Section 2	The last paragraph on page 2 discusses situations where isolation between the AOA and aircraft required systems are provided by complex means. Item (3) on page 3 states that the system must be stand-alone and must not interface with a certificated system.	These two statements appear to conflict with each other.	If the intent is that the system must not interface with a certificated system, then remove the discussion regarding isolation between the AOA and required systems being provided by complex means.	The intent is not to prohibit the installation of simple or complex AoA. Either one can be installed but the level of detail safety evaluation requirement changes for complex system. The applicant may require safety assessment for complex versus qualitative assessment for simple.
ACE-117C, Marty Papanek, 847-294-8114	ASTM F3011-13, Pg 1, paragraph 1.1.	What is simple versus complex?	Interpretation can take on different meanings (DO-254?).	Provide some explanation of a simple or complex system. How about a stand-alone system versus one that feeds a primary display or autothrottle?	Acknowledged: The ASTM is vague and does not define the terminology between Simple and complex. The ASTM standard was proposed by industry and accepted by ACE-100 management. They proposed this standard for AoA design approval. This is the reason for mandating additional

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					<p>requirements in the memo to try to account for this lack of definition.</p> <p>During the approval process the applicant in its approval letter is required to provide justification as to why their system is simple or complex. The ACO will review and concur / non-concur with applicant's position.</p>
ACE-116W, Riddle	General	The memo does not permit installation of these systems into commuter or transport category airplanes.	Can these systems be installed in a high performance Part 23 jet powered airplane which is more complex than a commuter category turboprop?		<p>Explanation:</p> <p>The Memo limits the installation to part 23, Normal, acrobatic, Utility, excluding commuter until such time there is enough data available to re-assess the effectiveness of AoA in reducing loss of control. If the mentioned aircraft is not a commuter category, then AoA can be installed via this memo and the ASTM</p>
ACE-	Page 1, para. 1	1 st sentence says this memo establishes requirements and procedures for issuing a design and production approval, but the remainder of the memo does not clearly and consistently describe the type of approval(s) being issued.	The procedure outlined in the memo seems to mostly describe design acceptance and production approval. However, even that is not completely clear – the sample LOA doesn't use the word "approval" at all.	Clarify the type of approval being issued and use consistent terminology throughout the memo and attachment(s).	Adopted:
ACE	Page 4, Para. 4	Describes issuance of a production approval but is silent regarding design approval.	Is the LOA both a design and production approval?	Clarify	Revised the memo and clarified.

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ACE	Page 2, para. 1.a.	Is the LOA a letter of approval or letter of authorization?	Page 2, para 1.a refers to a letter of approval (LOA). Sample letter attached is called a letter of authorization.	Clarify and use consistent terminology.	Adopted
ACE	Page 5, Sample letter	Is this an approval or not? If it's an approval, is it both design and production approval?	The word approval is not used anywhere in the letter.	Use consistent terminology, and if this is an approval state such. Also specify whether it constitutes both design and production approval.	It is clearly stated at the beginning of the Memo. <i>This memorandum establishes requirements and procedures for issuing a design and production approval to a United States (U.S.) manufacturer under Title 14 of the Code of Federal Regulations (14 CFR) 21.8(d)</i>
ACE	Page 2, para 1.a(3)	Is the information about the manufacturer's required statement of compliance sufficient?	The memo does not provide any details about what constitutes a legal statement of compliance for the purposes of an LOA. Does the statement need to be signed? By whom?	Provide more definition of the type of statement needed in order to satisfy this requirement, such as the statement needs to be made and signed by an individual legally representing the applicant.	The sample LOA provided in the memo outlines the requirements for approval. Any representative of the company or authorized agent can sign the LOA.
ACE-114	General	For parts under design approval, 21.3 requirements apply. Are the same expectations in place for a manufacturer to report issues with this non-required equipment.	Most producers of these types of systems do not expect to be included in typical 21.3 reporting cycles.	Clarify how 21.3 is expected to apply to these systems, if we are going to require design approval.	Good point: Currently, this is under consideration and has been discussed in detail. This is one of the reasons we initially want one ACO to handle all the approvals. Hopefully, as this equipment gets installed and gain service history, we can tabulate any problems reported by the operators

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					<p>quickly and further assess whether to make this a mandatory reporting under 21.3.</p> <p>The 3 year timeframe gives us a chance to assess what are some of the changes we need to make (e.g., mandatory reporting per 21.3) before expanding the scope beyond AoA.</p>
ACE-114	General	For parts under design approval, 21.50 requirements apply. Are the same expectations in place for a manufacturer for ICA for this non-required equipment?	Most producers of these types of systems do not expect to be included in typical ICA requirements for these simple systems.	Clarify how 21.50 is expected to apply to these systems, if we are going to require design approval.	<p>Explanation:</p> <p>In ASTM (4.3.6) ICA is part of the approval process. However, the format and the requirements of 21.50 are not directly applied to non-required equipment. This does not relieve the applicant's responsibility from submitting an acceptable ICA that is adequate for continued airworthiness of the AoA.</p>
ACE-117C Flight Test, William Jaconetti, 847-294- 7161	Page 1.	Adding these systems to an aircraft is a change in type design. Based on 14 CFR 21.93 a better process would be to utilize the STC process along with policy and an AC that allows for fast-tracking.	Creating a new approval method for this type of modification is artificial when current mechanisms exist to already handle the approval. There are many types of products that applicants would say will enhance safety but not be required equipment, not sure why this would be handled uniquely.	Create an AC that allows for streamlining the approvals of these types of systems and utilize the AML STC process for installation.	<p>Not adopted.</p> <p>Adding an AoA to an airplane is not a change in type design; the result is a properly altered aircraft. This is a design/production approval similar to a TSOA. Industry requested a streamlined method of approval, so we are trying this pilot program.</p>

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ACE-117C, Roy Boffo, 847-294-7564	General	Installation of AoA systems on airplanes approved for flight into known icing (FIKI) should be prohibited without further approval.	The specification mentions icing for testing of the system, but not effects of accumulated ice on the airplane.	Add a statement to the memo that it doesn't apply to FIKI approved airplanes without further approval.	Acknowledged: The AoA is a supplemental equipment and by its definition "supplemental" usage should not be used as the primary instrument, whether in icing condition or otherwise. The ASTM does address icing condition for the AoA (6.2), therefore there is no need to mention it in the memo.
ACE-117W Baker	Page 2 – Section 2 . General	Under AoA Design Requirements, a paragraph should be included installation instructions that assures that the night lighting for the system be evaluated and that the lighting must be compatible with the installed lighting in the airplane that is being modified.			Acknowledged: Under design requirements " <i>system installation instructions must require that the installation of the AoA display will not interfere with pilot's view of primary flight instruments.</i> " This also considers and evaluates the effect of lighting during all operations.
ACE-117C Flight Test, William Jaconetti, 847-294-7161	Pages 2 & 3.	There is no guidance on visual or audio warnings.	With no guidance on appropriate use of color or of audio warning we could introduce significant distraction to the pilot of a part 23 aircraft. The addition of the equipment needs to be intuitive and in line with general aerospace principles. Although we do not want to stifle innovation, we can introduce a negative consequence by not having any guidance.	Recommend making reference to appropriate use of color and audio.	Partially adopted: Good comment Although, we don't dictate the color or audible cue for non-required AoA in the memo, we did further clarify the misleading information part of the memo (i.e., visual and audible cue).

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ACE-117C, Roy Boffo, 847-294-7564	Page 3, paragraph 2.(2).	Calibration should be part of an ICA.	There is no mention of ICA.	Need AEG involvement.	ASTM (4.3.6) <i>Instructions for Continued Airworthiness</i> —The manufacturer of the AoA system shall provide continued airworthiness procedures necessary to ensure safe and accurate operation (calibration , alignment to aircraft, maintenance, etc.).
E. Kolano, ANM-160S (425) 917-6519	Page 3, Paragraph 2(2)	AoA system calibration	There is no mention of who can perform the test after calibration to ensure the AoA does not provide information conflicting with the stall warning, if installed. If simply the owner/operator, this may introduce an unacceptable safety risk.	Address who can perform the test following calibration.	4.3 <i>Installation Manual</i> —The manufacturer of the AoA system shall provide an installation manual that specifies the following information so that an installer can determine appropriate use for an aircraft installation: This is specified in the ASTM standard 4.3.5.
ACE-117W Baker	Page 3 – (2)	Under AoA Design Requirements, paragraph (2), the required "test" should be listed as "flight test(s)" to determine that the AoA does not provide conflicting information with the stall airplane stall warning system.			Not adopted: Good comment This is the responsibility of the installer to assess whether a flight test is required and is not part of the article approval process.
ACE-117W Baker	Page 3 – (3)	AoA Design Requirements, installation instructions paragraph (3), advises that the system installation is prohibited in commuter or transport category airplanes. It is suggested that the installation also be prohibited in any Normal Category aircraft that has a type certified AoA system that is already installed as a part of the original type design. These systems are frequently provided in small Normal Category turbine powered airplanes.			Explanation: If the AoA system is provided as part of the certificated system then there is no need for a second supplemental AoA. What potential benefit is gained by two AoAs?

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ACE-117C, Jeffrey Kuen, 847-294-7125	Page 3 Paragraph 2.(3).	The electrical power should be supplied from an independent circuit breaker/fuse and from a non-essential bus.	The system should be easily turned off, to eliminate distractions or potentially misleading information due to device failure. The system should not be connected to essential or required busses on the aircraft.	Require the appropriate instructions in the installation manual.	Not adopted: Beyond the scope of this memo which approves the article, not the installation. Using standard practices the installer is expected to use their knowledge of aircraft to properly install the AoA.
ACE-117C, Jeffrey Kuen, 847-294-7125	Page 3 Paragraph 2.(4).	The sentence states «must not provide misleading information or nuisance alerts to the pilot. »	This is an interesting phrase since the system is developed to the design assurance level (DAL) E. Therefore, the system could have many errors which could cause misleading information.	Reword the statement.	Partially adopted: Revised the specific section for better clarity.
ACE-117C Flight Test, William Jaconetti, 847-294-7161	Page 3, Section 2, paragraph (5).	Provide additional guidance on how a manufacturer will ensure that the system will not create interference or have adverse effects on other systems.	Depending on installation and wire routing there could be electromagnetic compatibility (EMC) issues on some aircraft.	Include requirement for a post-installation EMC check. Have the manufacturer provide guidance on how the EMC check will be performed.	Not adopted. By default, under design requirements 3, and 4, it covers the EMC check during operational check which is outside the scope of the parts approval.
ACE-116W, Paul DeVore	Page 3 - (7)	Neither ASTM F3011-13 nor the policy memorandum require the manufacturer to state that the system may not function properly and may give misleading information during and after flight in icing conditions.	If the unit is installed in an airplane approved for flight into known icing conditions, the AOA system meeting the minimum requirements would not be expected to function properly and could provide misleading information. For other aircraft entering icing conditions inadvertently, even brief icing encounters may affect AOA function.	Add to Note (7) a requirement for the manufacturer to provide a caution regarding the potential misleading output of the AOA, both during and following any icing exposure.	Not adopted The ASTM 4.2.4 provides restriction regarding the use and application of deicing fluid with the system. Section 6.2 “Icing” further states that the system shall not be permanently damaged when Icing occurs. The AoA manufacturer by default will address if the AoA is used during the icing condition. In addition the memo clearly states under design requirements that “A failure of the AoA

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					<i>system to perform its intended function or display erroneous indications must not adversely affect the safety of the aircraft.....,”</i>
ACE-117W Baker	Page 3 - (7)	Under AoA Design Requirements, paragraph (7), this paragraph should clearly state that the installation instructions require that the following "Operating Limitations be included in the Aircraft Flight Manual Supplement" for the installation.			Partially Adopted: Revised memo and removed Flight manual requirement in addition to Operational limitations based on other commentator's comments
ACE-116W, Paul DeVore	Page 3 – (8)	Interference with pilot's view of primary flight instruments is addressed, but flight controls is not mentioned.		In Item 8, after "view of primary flight instruments" add "or primary or secondary flight controls."	Acknowledged Beyond the scope of this memo. The intent is to make the installer <u>aware</u> of possible situations without getting in to details.
ACE-117C Flight Test, William Jaconetti, 847-294-7161	Page 3, Section 2, paragraph (8).	Address glare and reflections along with interference of view of the primary instruments.	It may not be clear to manufacturers, installers and inspectors that interference with view can include glare and reflections. 23.773(a)(2) provides good wording.	Recommend adding reference of "Free from glare and reflections that could interfere with the pilot's vision. Compliance must be shown in all operations for which certification is requested".	Acknowledged Beyond the scope of this memo.
E. Kolano, ANM-160S (425) 917-6519	Page 3, Paragraph 2(8)	Wording of visual interference.	The stated requirement is the AoA display must not interfere with the pilot's view of the primary flight instruments. This wording implicitly allows interference with the pilot's compartment view (regulatory requirement) and of all non-primary flight instruments, controls, placards, etc.	Re-word and clarify appropriately.	Not adopted The wording in the document is a general caution and awareness to the installer to consider. It is the installer's responsibility to ensure there is no interference caused by AoA. which is

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					beyond the scope of this memo.
<p>ACE-117C Flight Test,</p> <p>William Jaconetti, 847-294-7161</p>	<p>Page 3, Section 2, paragraph (8).</p>	<p>Have you thought about adding some bounds for installation applicability?</p>	<p>Neither the Policy Memo nor the ASTM Spec provide appropriate guidance on how to ensure the system will be installed properly for different airframes. The memo puts the burden on FSDO inspectors to determine appropriate installation applicability. Without appropriate design and test, inspectors will have no tangible data on when installation is appropriate.</p>	<p>AoA manufacturer should provide a list of aircraft or aircraft types that their product can be installed on. The list should have a combination of test and analysis that give a reasonable chance that the system will work appropriately on that airframe. The install manual should have recommended installation locations for each aircraft or type of aircraft. This in conjunction with the calibration requirements already in the policy should increase the chances that it will work appropriately.</p>	<p>Explanation: Acknowledged Beyond the scope of this memo.</p> <p>This memo only approves the article.</p> <p>Side note: This is exactly what the GA industry and ACE-100 management requested. To put the Onus on the installer to make the installation suitability determination as long as the article itself is approved.</p>
<p>ACE-116W, Paul DeVore</p>	<p>Page 4</p>	<p>Manufacturing requirements do not state that the ACO should be notified of design changes (major or minor). In addition, for each major change to type design, the manufacturer should submit a statement of continued compliance with design</p>	<p>Similar to requirements for manufacturers holding TSO authorizations or PMAs, the FAA should be informed of design changes, and major design changes should be approved prior to implementation.</p>	<p>Include a requirement that the manufacturer inform the ACO of all minor and major design changes within an agreed timeframe. Include a requirement that the manufacturer</p>	<p>Not adopted This is not required equipment and does not fall under the same ACO oversight as required equipment, which requires FAA oversight.</p>

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		requirements of ASTM F3011-13 and the requirements of this memo for the changed component(s).		submit a statement of continued compliance with the design requirements of ASTM F3011-13 and the requirements of this memo for the changed component(s).	
ACE-116W, Paul DeVore	Page 4	Manufacturing requirements do not state that a quality manual is required to be provided to the FAA.	Similar to requirements for PMA's and TSO's a quality manual should be required and provided to the FAA.	Add a requirement that a quality manual provided.	Not adopted. Quality control is part of the applicant's production approval. Once they certify that they meet the production requirements, by default it addresses the quality manual.
ACE-116W, Paul DeVore	Page 4	The company must have access to all design data that defines the components. This includes purchased parts.	This is similar to requirements for PMA's and TSO's.	Under Manufacturing Requirements, add the requirement that the manufacturer must have access to all design data that defines the components.	Not adopted. Since this is non-required equipment we determined that the supplier control through the applicant's quality system is adequate.
ACE	Page 4, para (1)	The noted operating limitations include an advisory	How can an advisory be a limitation ?	This should not be an operating limitation	Explanation The word "Advisory" means "advising" to the end user that it cannot be used as a primary instrument replacing an existing stall warning or AoA system. This is an additional provision added to ASTM (reference to ASTM

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					section 4.3.3.)
ACE-117C Flight Test, Ron McElroy, 847-294-8195	Page 4, Section 4. ACO Responsibilities.	Insufficient listing of items for ACO review.	Despite the premise that the AoA system is a non-required/supplemental system, it will likely be a compelling display of information. Therefore, the ACO should conduct a more diligent review of the actual operation of the system rather than a more simplified paperwork exercise.	Consider added listing of minimum ACO review items: <ul style="list-style-type: none"> • Compliance documents. • Design as an independent system. • Installation document. • Airplane Flight Manual Supplement, operating limitations, placards, procedures and function. • Demonstration of AoA versus installed stall warning system comparison. 	Not adopted These are certification requirements. The memo addresses approval of article. The installation instructions and its provisions are part of AoA design requirements. The suggested requirements are for certifying the AoA as it is installed in the aircraft.
Daniel Hilton ACE-119W	ASTM F3011-13, item 5.5	Similar to the ASTM software requirements, there should be similar requirements for airborne electronic hardware (AEH) devices. Also should consider better defining what “controlled by the manufacturer” means.	The ASTM standard is unclear in this regard.	1)Add a requirement similar to item 5.5 from ASTM F3011-13 to address AEH. 2)With regard to ASTM F3011-13 item 5.5 (software), consider better defining what “controlled by the manufacturer” means.	Not adopted The specific software configuration and revision level are requirements for primary airborne equipment and does not apply to non-required, supplemental equipment. Although, the applicant is responsible to have those available in case of an audit due to reported

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					problem, but it is not required as part of their approval submittal.
ACE-117C, Marty Papanek, 847-294-8114	ASTM F3011-13, Page 2, paragraph 6.	The Environmental Requirements seem to lack detail. Do these apply to Part 23 only or Part 25, 27 and/or 29?	The applicability paragraph of the Memo states that the policy doesn't apply to commuter and transport category airplanes, but could be construed to apply to helicopters.	Clarify what CFR Part this applies to.	At the beginning it clearly states <i>“for issuing a design and production approval to a United States (U.S.) manufacturer under Title 14 of the Code of Federal Regulations (14 CFR) 21.8(d)”</i> Under applicability section: <i>This memo applies only to systems installed in U.S.-registered aircraft, excluding commuter and transport category airplanes.</i>
ACE-117C, Marty Papanek, 847-294-8114	ASTM F3011-13, Page 2, paragraph 6.1.2.	This implies that damage to the device is acceptable – as long as it is not permanent.	Damage to this device should be assessed as far as the impact to the system to determine if system is functional .	Temperature range (category) should be explicit.	Not adopted This is non-required supplemental equipment and does not fall under the same functional requirements as a primary instrument.
ACE-117C, Roy Boffo, 847-294-7564	ASTM F3011-13, Section 6.	Paragraph 6.1 should include a statement that DO-160E applies to the entire section and not just RF emissions and also include what category (where applicable).	The AoA manufacturer should have more detailed instructions regarding required testing.	Change the ASTM specification or add the information to the memo.	Not adopted The ASTM standard was proposed by industry and accepted by ACE-100 management. They

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					proposed this standard for AoA design approval.
ACE-117C, Roy Boffo, 847-294-7564	ASTM F3011-13, paragraphs 1.1 and 3.1.2.	The paragraphs conflict with the memo in stating that the AoA system can have a connection to the aircraft or other systems.	The memo states that there is to be no other connection than the power.	Fix the ASTM document.	<p>Acknowledged: The ASTM is vague and does not provide the terminology between Simple and complex. The ASTM standard was proposed by industry and accepted by ACE-100 management. They proposed this standard for AoA design approval. This is the reason for mandating additional requirements in the memo to try to account for this lack of definition.</p> <p>During the approval process the applicant in its approval letter is required to provide justification whether their system is simple or complex. The ACO will review and concur / non-concur with applicant's position.</p> <p>The memo does not prohibit complex system that requires more than just a power connection. It requires further</p>

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					substantiation by the applicant when they design their AoA system.