

Comment #	Paragraph Number	Commenter	Comment Summary & Recommendation	Disposition
1	1-4.a.	ACSS	Figure 1 only represents the ADS-B and ADS-R target sources as 1090Mhz. Recommend showing an example of a UAT ADS-B In system.	No Action. Text describes situation.
2	2-7.c.(2)	ACSS	Change the total latency requirement for traffic data from 3 seconds to 3.5 seconds per DO-317A.	Accept
3	Appendix 1, Figure 2.	ACSS	Change the ASSAP latency budget for traffic data from 2.0 seconds to 2.5 seconds per DO-317A.	Accept
4	3-1	ACSS	Ground and flight tests assume ADS-B Out certified to AC 20-165, what if DO-260 or DO-260A?	No Action. This issue will soon be OBE.
5	3-3.c	ACSS	State the test objective for the verifications of TCAS validations. TCAS validation is mentioned in item (1), (2), and (3) with no test objectives discussed.	No Action. The objectives are listed in section 3-3. The flight test is not a software test. It is assumed that the TCAS validation is being performed in accordance with DO-317A. If so, the presence of the traffic on the display will validate that the TCAS and ADS-B are correlating properly.
6	3-3.c	ACSS	We concur that basic flight testing for ADS-B In display and human factors using targets of opportunity can be done in flight test. Performing the flight test scenarios for ITP can be better demonstrated in the lab environment as test parameters can be better controlled, and certified cost can be contained.	Added text to discuss ITP flight test objective. The TCAS validation cannot truly be tested in the lab. The ITP flight test section provides the vehicle to test this function in flight.
7	General	Garmin	This AC is over 40 pages long. It would be helpful for FAA to assist industry reviewers by using change bars to identify content that has changed from one revision to the next to make best use of industry resources.	No Action. We apologize and will attempt to do so with the next revision.
8	General	Garmin	The AC repeatedly identifies itself as “20-172a”. FAA AC revisions are identified by capital letters, not lowercase letters. Change all instances of “20-172a” to “20-172A”.	Accept
9	General	Garmin	Change all instances of “DO-317a” to “DO-317A”	Accept

10	General	Garmin	Per TSO-C195a, EVAcq allows for display of multisource traffic (ADS-B, ADS-R, TIS-B, TAS, TCAS) and references to it should be clear in the definition and use of the EVAcq and AIRB.	Accept. Add wording to 2-3 c. as follows: "This application is designed to support display of ADS-B traffic, including ADS-R, TIS-B, and TCAS derived traffic."
11	1-3	Garmin	The AC states, "the latency analysis between a GPS position source and the ADS-B equipment may be reused on a follow-on installation provided that the hardware and software part numbers for both units are identical." Identical SW part numbers could be problematic as minor SW changes with no impact on the latency analysis can be expected. These minor SW changes can impact both the GPS position source and the ADS-B equipment SW P/Ns. The AC should allow for minor SW changes to be used for follow-on installation provided the equipment manufacturer(s) document that there are no changes to latency.	Accept. Insert text after third sentence: "Modifications to previously approved Hardware or Software must be evaluated to determine data applicability."
12	2-2, Table 1	Garmin	The AC's equipment class table should be updated to be consistent with the published TSO-C195a.	Accept. Replace Table 1 with new table in TSO-C195a.
13	2-3.c	Garmin	"This application is designed to support only display of ADS-B traffic." Suggest changing to "This application is designed to solely display traffic."	Previously modified in response to comment above.
14	2-3.c	Garmin	Clarify what 'other applications' means in the statement "implementations that include other applications."	Accept. Replace "other applications" with "other application classes"
15	2-3.d	Garmin	The paragraph references 'airborne application.' This should be 'AIRB.'	Accept
16	2-3.d	Garmin	"The enhanced visual approach application should not be confused with creating a new approach operation." This seems like it could be easily confused as referring to Enhanced Visual Approach (EVapp) from DO-317. Consider revising/rewording and specifically calling out the 317A application it is referring to.	Accept use VSA

17	2-4.a and 2-4.b	Garmin	<p>2-4a: “Sidemounted \displays are acceptable for the basic situational awareness applications and ITP, but have limited potential to support more advanced applications.”</p> <p>2-4b: “ITP installations must include a CDTI mounted in the forward field of view or as a side mounted display.”</p> <p>Seems redundant.</p>	No Action.
18	2-4.c	Garmin	<p>“Minor TSO changes or enhancements, may be made to the previously approved traffic display without requiring the equipment to be made fully compliant to TSO-C195a requirements. This exception only applies to previously approved traffic displays. If any other applications beyond EVAcq or AIRB are installed, the display must be fully compliant with TSO-C195a.”</p> <p>Does this indicate that previously certified displays can be made partially compliant with TSO-C195a and then claim ADS-B In compliance for AIRB? If this is incorrect, then this section should be reworked or reworded to remove this implication.</p>	I can see the point. However, the intent is only to allow minor mods to existing displays. Adding a new TSO to a display is a major modification.
19	2-4.c(1)	Garmin	<p>The paragraph states, “The flight manual supplement for the ADS-B equipment must specify the location of the horizontal position reference point on the traffic symbols and the own ship symbol.”</p> <p>In past discussions with FAA, Garmin brought up the issue that requiring an AFM change for ADS-B Out equipment installed via field approval is problematic. Garmin is not aware that this issue has been resolved, so it will be similarly problematic for field approvals of ADS-B In equipment. During the past discussion with FAA, it was indicated that an AFMS is needed for a limitations change or an emergency procedures change; neither of these situations seem to apply to specifying “the location of the horizontal position reference point on the traffic symbols and the own ship symbol.” Garmin suggests that this information is more appropriate to be included in a pilot’s guide and the quoted sentence should be changed accordingly.</p>	Agree. Modify statement from “flight manual supplement” to “pilot’s guide”
20	2-6	Garmin	<p>“The installation should include a UAT (per TSO-C154c) or a 1090 ES (per TSO-C166b) receiver.”</p> <p>Shouldn’t this be a ‘must’ statement?</p>	Agree. Change “should” to “must”. Add footnote that Garmin asked for this. ☺

21	2-7.c(7)	Garmin	Spell out the acronym CPDLC (Controller Pilot Data Link Communications)	Accept
22	3-3.c	Garmin	Paragraph 3-3.c states, “A flight test of ITP should successfully demonstrate the scenarios below.” It is not clear what constitutes the scenarios. It is not clear whether the items of table 2 constitute the scenarios and whether each item of table 2 needs to be verified by flight test. Some items of table 2 (e.g. integrity bounds) would be impossible to exercise in flight test.	Accept add the word “three” in front of scenarios to clarify
23	3-3.c	Garmin	This paragraph should include AC 20-140A title in italics to be consistent with other AC references. Also, other AC references don't seem to include the revision. AC references should be consistent.	Accept
24	Appendix 4	Garmin	Need to add reference to AC 20-140() which is referenced in paragraph 3-3.c.	Accept
25	2-3. e	Rockwell Collins	<p>Draft AC text states: “This map consists of all airport runways and includes taxiways when the data is available.”</p> <p>Comment: Does the word “all” in the above sentence imply a requirement to display runways that are typically not in the ARINC 424 Nav Data Base, such as water runways and non-hard surface runways? The majority of airports do not have the detailed runway and taxiway data required for an Airport Map Data Base such as defined in ARINC 816. For airports that do not the runway and taxiway data available, a runways-only display can be created using the ARINC 424 data.</p> <p>Recommend rewording the sentence such that the clause “when the data is available” applies both the runways and the taxiways.</p> <p>“This map consists of the airport runways available in the navigation data base and includes taxiways when the data is available.”</p>	<p>This is not a unit requirement. It is an application description. Regardless, the database used to depict the runways needs to meet 5 meter accuracy and that may not be the case for ARINC 424. So the applicant would need to address that issue. The desire is to include all hard surface runways (water and grass runways are out of scope).</p> <p>Reword sentence as follows: “This map consists of all runways at supported airports and includes taxiways when that data is available.”</p>

26	Page 1 Para. 1-1c	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“... The term “must” is used to indicate mandatory requirements when following the guidance in this AC. The terms “should” and “recommend” are used when following the guidance is recommended but not required to comply with this AC...”</i></p> <p>We recommend revising the text to state:</p> <p><i>“... The term “must” is used to indicate mandatory requirements when following the guidance in this AC. <u>All other terms such as “should”, “recommend”, and “may” as well as sentences in imperative form without the term “must” such as “provide...”, “evaluate...”, “verify...”, and “observe...”</u> are used when following the guidance is recommended but not required to comply with this AC...”</i></p> <p>While Boeing agrees that there must be terms in the AC to distinguish a mandatory requirement from a recommendation, the proposed wording does not completely account for the different terms that are used in the proposed AC. We suggest that the wording be revised in order to state that only those sentences with the term “must” are mandatory. For example, it could be unclear to the applicant whether paragraph 3-2f is mandatory.</p>	<p>Although Boeing makes a fair comment, the terms must and should are used when FAA desires to make the situation clear. In other cases, the text should stand on it’s own. For instance, the case of 3-2f is clearly meant to apply to any installation. Rewording this bullet as a must does not clearly improve the readability of the AC.</p>
27	Page 5 Para. 2-3d	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“The visual separation on approach application builds upon the airborne application.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“The visual separation on approach (<u>VSA</u>) application builds upon the <u>basic</u> airborne application (<u>AIRB</u>).”</i></p> <p>For clarity, the addition will ensure that the AC is referring to the same applications that are referenced in Table 1.</p>	<p>Accept</p>

28	Page 5 Para. 2-3d	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“... The enhanced visual approach application should not be confused with creating a new approach operation. No operational responsibility is changed when using the enhanced visual approach application.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“... The <u>VSA</u> application should not be confused with creating a new approach operation. No operational responsibility is changed when using the <u>VSA</u> application.</i></p> <p>The enhanced visual approach (EVApp) application is an obsolete term. The substitution that we recommend will ensure consistency with DO-317A.</p>	Accept
29	Page 5 Para. 2-3e	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“The basic surface application with runways and taxiways displays ADS-B traffic on a plan view (bird’s eye view) relative to own-ship, superimposed on a map of the airport surface.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“The basic surface application (<u>SURF</u>) with runways and taxiways displays ADS-B traffic on a plan view (bird’s eye view) relative to own-ship, superimposed on a map of the airport surface.”</i></p> <p>For clarity, the addition will ensure that the AC is referring to the same application that is referenced in Table 1.</p>	Accept

30	Page 6 Para. 2-4c	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“To use alternate symbols or features, a human factors analysis must demonstrate that a clear and substantial benefit can be derived. Applicants electing to use different symbols must compare the differences with appendix 2 and address any potential negative impact to pilots who are familiar with the standard symbols.”</i></p> <p>We recommend revising the text to state:</p> <p><u><i>“However, manufacturers may propose alternate symbols in order to integrate ADS-B with existing flight deck symbology. These alternate symbols will need to be justified by human factors analysis as part of the certification process. Alternate symbol sets are not allowed without additional justification.”</i></u></p> <p>The proposed AC wording suggests that benefits of introducing alternative symbols be demonstrated. We recommend a human factors analysis be conducted per wording in paragraph 2.3.4.2.3.2 of DO-317A.</p>	Accept
31	Page 8 Para. 2-6	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“... The ASSAP equipment may interface with the ADS-B receiver equipment or it may be integrated...”</i></p> <p>We recommend revising the text to state:</p> <p><u><i>“... The ASSAP equipment may interface with the ADS-B, TIS-B, and ADS-R receiver equipment or it may be integrated...”</i></u></p> <p>In addition to ADS-B, the aircraft also receives TIS-B and ADS-R signals.</p>	No Action

32	Pages 13-15 Para. 3-3	Boeing Commercial Airplanes	<p>The proposed text enumerates the conditions that the certification flight test should verify. We recommend adding the following text under paragraph 3-3 to state:</p> <p><i><u>“[Insert specific conditions such as ITP operational geometries] may be demonstrated in a conformed ground simulator environment.”</u></i></p> <p>Due to the high cost of flight test certification, allowing demonstration of specific scenarios on the ground is critical to the success of the deployment of ADS-B In applications. Supplementing the enumerated test conditions with the intent of the requirement will also assist the applicants in determining other acceptable means of compliance with this AC.</p>	<p>Add text after first sentence of 3-3 c.</p> <p>“The intent of ITP Flight Testing is to validate that the equipment functions properly when installed on the aircraft. It is not the intent of the ITP flight test to exhaustively test ITP geometries. Individual ITP scenarios to test each ITP geometry may be performed in a conformed ground simulator environment. The scenarios below were chosen to be representative of key operational ranges at which the equipment operates differently. The TCAS validation functionality in particular is difficult to test adequately on ground or in a laboratory environment. This is due to the challenge of creating an RF simulation that accurately reflects the in flight environment and aircraft installation effects.”</p>
33	Page 14 Para. 3-3c(1)	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“... If TCAS validation is implemented, the ITP equipment will use TCAS measurements (range, bearing, and altitude) to validate ADS-B position.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“... If TCAS validation is implemented, the ITP equipment will use TCAS measurements (range, bearing, and altitude) to validate ADS-B position <u>for version 0 and version 1 targets.</u>”</i></p> <p>The addition will provide clarity to the TCAS validation requirement and will ensure consistency with paragraph 2.2.4.4.2.1 of DO-317A.</p>	<p>Accept</p>

34	Page 14 Para. 3-3c(2)	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“...If TCAS validation is implemented, the ITP equipment will use TCAS measurements of opportunity (range, bearing, and altitude) to validate ADS-B position when able...”</i></p> <p>We recommend revising the text to state:</p> <p><i>“... If TCAS validation is implemented, the ITP equipment will use TCAS measurements of opportunity (range, bearing, and altitude) to validate ADS-B position <u>for version 0 and version 1 targets</u> when able...”</i></p> <p>The addition will provide clarity to the TCAS validation requirement and will ensure consistency with paragraph 2.2.4.4.2.1 of DO-317A.</p>	Accept
35	Appx. 2 Page A2-1 Para. 1	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“Traffic symbols can be modified from the basic symbol to provide special status information, such as on-ground, selected, coupled, and alerted.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“Traffic symbols can be modified from the basic symbol to provide special status information, such as on-ground, selected, <u>designated</u>, and alerted.”</i></p> <p>The term “coupled” has been replaced with “designated” in DO-317A.</p>	Accept

36	Appx. 2 Page A2-5 Para. 2d (1)	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“... For example, in visual separation on approach (VSA), the traffic to be followed is “designated” so that the application and the flight crew both know the specific traffic upon which to act.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“... For example, in visual separation on approach (VSA), the traffic to be followed may be shown as “designated” so that the application and the flight crew both know the specific traffic upon which to act.”</i></p> <p>None of the initial ADS-B In applications, including VSA, is designated. Designated features are optional for the VSA application per DO-317A.</p>	Accept
37	Appx. 2 Page A2-6 Para. 3b	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“b. Traffic Advisories (see Figure 10)”</i></p> <p>We recommend revising the text to state:</p> <p><i>“b. Traffic Advisories (see Figure <u>11</u>)”</i></p> <p>Our suggestion corrects the reference to the figure on traffic advisory symbols.</p>	Accept

38	Appx. 3 Page A3-2 Para. s	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“s. Coupled Application. An application that operates only on specifically-chosen (either by the flight crew or automation) traffic. They generally operate only for a specific flight operation. Coupled applications include: enhanced visual approach.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“s. <u>Designated</u> Application. An application that operates only on specifically-chosen (either by the flight crew or automation) traffic. They generally operate only for a specific flight operation. Coupled applications include: enhanced visual approach.”</i></p> <p>The term “coupled” has been replaced with “designated” in DO-317A. In addition, VSA is not a designated application.</p>	Accept. Previously addressed in Field comments.
39	Appx. 3 Page A3-2 Para. t	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“t. Coupled Traffic. Traffic upon which a coupled application is to be conducted.”</i></p> <p>We recommend revising the text to state:</p> <p><i>“t. <u>Designated</u> Traffic. Traffic upon which a <u>designated</u> application is to be conducted.”</i></p> <p>The term “coupled” has been replaced with “designated” in DO-317A.</p>	Accept. Previously addressed in Field comments.

40	Appx. 3 Page A3-3 Para. dd	Boeing Commercial Airplanes	<p>The proposed text states:</p> <p><i>“dd. Enhanced Visual Approach (EVApp). This application aids the pilot in identifying and maintaining separation from a lead aircraft when performing a visual approach operation.”</i></p> <p>We recommend deleting the EVApp definition and add:</p> <p><i>“{Insert correct paragraph number.} <u>Visual Separation on Approach (VSA)</u>. {Insert definition of VSA.}”</i></p> <p>The enhanced visual approach (EVApp) application is an obsolete term. The substitution will ensure consistency with DO-317A.</p>	Accept. Previously addressed in Field comments.
41	2-4 a.	NASA	2-4.a - Instead of saying "flight deck traffic display (i.e., CDTI)" I would recommend "cockpit display of traffic information (i.e., CDTI)" or taking the "(i.e., CDTI)" out. This will hopefully avoid the discussions we had in WG4 between CDTI and Traffic Display. From DO-317A - "At a minimum, CDTI includes a graphical plan-view (top down) traffic display, in these MOPS referred to as the Traffic Display, and the controls for the display and applications (as required)."	No Action.
42	2-4 b.	NASA	2.4.b - Is it true that the traffic display (plan view) must be visible during the ITP vertical maneuver? I thought you had to maintain SA during the climb and you could do that via the ADS-B traffic display or via the TCAS display. Unless this is true, I would recommend deleting this sentence. Alternatively you could just say "ITP installations must include a traffic display (plan view)."	No Action. Yes it is true.
43	2-4 b.	NASA	<p>2-4.b - I agree with the paragraph as written and do not agree with removing the last sentence per comment 11 above unless the reason for the removal is that we should not put design guidance in an installation guidance AC. Even then I would be inclined to leave it in. I can draw pictures to illustrate why I think a vertical display greatly enhances SA.</p> <p>If the paragraph is left in, I would recommend modifying the last sentence to read "... may not be intuitive on the plan view display and flight crews might ..."</p>	Action taken on previous comment addresses this comment.

44	3-3 c.	NASA	3-3. c. Sentence 7 - "Verify that the ITP distance computed agrees with the planned value." How do you do that? What is the measure of truth? I am not sure what you are asking the implementer to do. Is it verify it is the distance you think it should be and not way off? It is probably just too late in the day for me!	No Action. The installer and manufacturer should understand how to compute ITP distance.
45	3-3 c. (2)	NASA	3-3.c.(2) - Do you have to pass this test? The MOPS says you only need to use TCAS if you have TCAS data. If the you aren't getting enough valid responses at say 32 nm, do you fail and do you have problems.	No Action. The test is written to allow the TCAS manufacturer to provide their range performance.
46	3-3 c (3)	NASA	3-3. c (3) I strongly agree with Doug's comment 15 and would encourage adoption of recommendation #1 only	No Action. ITP specific CPDLC operation should be evaluated during flight test for suitability.
47	3-3 c (3)	NASA	Comments on comment 13 - Doug is correct about ICAO. Does what ICAO say constitute regulatory guidance or law? Just because ICAO says only CPDLC if FAA wanted to approve SatVoice, could they? I do not always understand how ICAO guidance is viewed by States. Also, for whatever it is worth, I believe I know of at least one manufacturer who is integrating CDTI and CPDLC (unless I do not understand what integrated CDTI and CPDLC is).	Action taken on a previous comment addresses this comment.
48	Appendix 3 o.	NASA	Appendix 3.o - Is the 3rd sentence of the CDTI definition correct ["The CDTI is defined as a graphical plan-view (top-down) traffic display]. In DO-317A, in a similar sentence, we said "At a minimum, CDTI includes a graphical plan-view (top down) traffic display." I would stick with the DO-317A definition.	Accept
49	Appendix 1 Part 1	FAA ANG-C3	The 2 nd sentence refers to "uncertainty of latency", and describes it as the variation in total latency between updates. It is not clear that this is truly the quantity that is of interest, as paragraphs 4 and 6 refer to what is usually called uncompensated latency (or compensation error, or TOA accuracy). Latency uncertainty is addressed appropriately in those paragraphs by ensuring that the analysis demonstrates that uncompensated latency is less than the 1 second tolerance regardless of the latency variation. Recommend replacing this term with "compensation error" in the 2 nd and 5 th sentences. Also replace the parenthetical "I.e." with a definition of compensation error, such as "(i.e. the amount of uncorrected total latency)"	No Action. This statement is accurate. The rationale is that some legacy installations have large latency variation exceeding 1.5 seconds. This variation is more detrimental to the system operation than the worst case total latency.

50	Appendix 1 Part 2	FAA ANG-C3	It clearly states that the latency analysis is for position only on own-ship, but traffic is consistently not similarly qualified. Is the intention really to broaden the scope of latency analysis on traffic data? In any case, paragraph 4 can really only apply to position.	No Action. There is no intention here to discuss data other than position.
51	Appendix 1 Part 4	FAA ANG-C3	<p>Care must be taken in the case of time synchronized ADS-B messages (UAT or 1090) in the 2nd sentence . As long as the total latency analysis in paragraph (3) begins with the TOA at interface D (as opposed to the time of reception at interface D), then it is okay.</p> <p>I may be out of date on this issue, in which case you can reject my comment. But you may want to make clear in paragraph 3 that total latency analysis begins with the TOA of the data at interface D.</p>	No Action. Agree that T=1 installations and UAT nominal cases don't exactly follow this paradigm. However, addressing that level of detail in an example sentence will be information overload for most readers.
52	Appendix 1 Part 6	FAA ANG-C3	2 nd sentence is unclear. Compensation error as I understand it exactly comprises the 1 second tolerance. Is something else meant here, for example that the compensation error that is being analyzed for this AC should include all sources of error in the system, from interface D to G?	Accept. Add following text to end of second sentence: "between interfaces A3 and G."
53	Appendix 1 Part 6	FAA ANG-C3	<p>The third sentence instructs the designer to determine the total latency, but not what to do with it. Presumably this should have been done in paragraph 5 already.</p> <p>The first sentence of the paragraph tells the reader what they need to be analyzing correctly. If the next few sentences are to give direction on how to carry out the analysis, it could be made more clear.</p>	No Action. Part 6 was written to stand alone. So it does partially repeat Part 5. Specific text suggestions could be more readily incorporated.