

	Comr	nent		Comment summary	Suggested resolution	Comment is	Comment is	EASA	
NR	Author	Section, table, figure	Page			observation or is a suggestion*	or is an objection**	comment disposition	
1	FLARM Technology			The new revision is easier to read and understand than the initial version. Most changes will be beneficial for the users. However, there are three major concerns that have been introduced in this revision, which are discussed below.		No	No	Noted	Thar



nk you.





2 IARM Technology 2.2 7 The initial version stated that "Under the obver assumptions of correctly order the income the obversion provides of correctly order the activative the income income the income income the incom	Partially accepted work whic CS-2: safet acce more the S class For r any of Bene
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ed there may be an impact is the impact on the cload of the pilot when having to respond to an alert, h may vary between fixed wing and rotorcraft. For , the assessment has been minor, but the overall y benefit has been considered, resulting in the ptance of the installation under a minor change and recently a standard change whilst accepting that /W DAL may not be commensurate with that ification.

otorcraft, the overall safety benefit does not have data as of today.

text has been modified to refer to the Net Safety efit approach for CS-23.



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				used to collision warnings and such warnings should not be compared to e.g. TCAS RA. In this context, a truly incorrect warning cannot be considered as anything else than no safety effect/negligible failure condition, at least in CS-23 aircraft. It should also be noted that the considerations in section 3 anyway apply, i.e. volume level, etc.					
3	<i>FLARM</i> <i>Technology</i>	2.2	7	The CM establishes that "Under the [stated] assumptions the worst case failure condition [] at the aircraft level can be classified as Minor". This naturally also implies that specific installations can be considered as less than minor (i.e. no safety effect) depending on the circumstances. This is especially applicable for installations in CS-23 aircraft, but also for some CS-27 and CS-29 installations. This is however not clear from the CM, and might even be interpreted as contradicted by two other statements: Section 2.1 states that "this CM justifies a Minor classification for CS 27 & 29 types" (not just maximum/worst case). Section 3 states that "In the previous section a Minor hazard classification of failure conditions was assumed" (not just maximum/worst case). The implicit implication that "worst case" is intended will not be clear to many stakeholders.	Add the following paragraph at the end of section 2.2: If a failure condition classification and the following design and installation appraisal (see ASTM F3230-17), including consideration for the guidance in section 3, results in a negligible failure condition, the failure condition may be considered as such. Change the first sentence of the first paragraph in section 3 according to the following: In the previous section a Minor hazard classification of failure conditions was assumed in the worst case.	No	Yes	Not accepted.	In the with assur been



EASA	response

e assessment for failure condition in accordance the guidance of CS XX.1309, the worst case is to be med by definition. However, your intent has already addressed in the previous comment.





4	FLARM Technology	3. a)	8	Notwithstanding the footnote about the terms PFD and ND, the implications of the current wording are not clear, nor does the guidance relate to the installation but to equipment certification. First, the section already specifies that FLARM targets must be depicted in a mentally separable manner. In this regard, it is irrelevant on which display the targets are shown, since the "mentally separable" provision anyway applies. Second, as the footnote explains, the terms PFD and ND are traditional naming conventions without any standardized definition. It may be obvious which instruments are the PFD and ND in a classical EFIS-based "Basic-T" setup (from which the terms come), but very few aircraft today have this setup. Many modern aircraft instead have one or two large screens which include all functions of the traditional instruments. Even when considering the footnote that "areas" on displays are implied with these terms, rather than physical boxes, this just makes the guidance even more confusing. How does "presentation of FLARM traffic on a Navigation Display [] cannot be accepted" apply to "areas" on a display? Third, an ND is a subset of MFD (or an area or page(s) on the MFD) showing navigation information (e.g. "moving map"). Since FLARM traffic is depicted on a moving map on an MFD (this is the essential purpose of depicting traffic), it per definition, arguably, makes every FLARM traffic display an ND. In a broader sense, it should be noted that many light aircraft only have one moving map (where consequentially also FLARM- received traffic is depicted), which is normally the only MFD installed, which is then also the ND. In this context, using the term ND thus does not fill any effective purpose. Fourth, the motivation for not allowing depiction on an ND is that "a solid assessment of the display containment mechanisms ensuring primary information availability" is needed. This is however not	As explained under comment summary, there is not just no reason to restrict FLARM targets on an ND, but the terms PFD and ND cannot be defined, nor interpreted, in any meaningful way. The appurtenant guidance should therefore be removed according to the following: <i>If a display is used to depict FLARM</i> <i>"targets" it must depict the information in a</i> <i>"mentally separable" manner- without</i> <i>having to spend much time to consider</i> <i>which information is from FLARM and which</i> <i>from other systems. This is obvious for</i> <i>hardware-separated displays, but for</i> <i>integrated systems (e.g. a multi-function</i> <i>display) a distinctive, easily identifiable</i> <i>FLARM presentation is of paramount</i> <i>importance. More advanced applications,</i> <i>such as presentation of FLARM traffic on a</i> <i>Navigation Display (ND)³ or in combination</i> <i>with synthetic vision on the Primary Flight</i> <i>Display (PFD) cannot be accepted without a</i> <i>solid assessment of the display containment</i> <i>mechanisms ensuring primary information</i> <i>of the FLARM information on a PFD or a ND</i> <i>cannot be accepted within a minor change</i> <i>classification per Part 21.A.91 for night VFR</i> <i>or IFR certified aircraft.</i> The footnote should consequently also be removed. If this is not accepted as the only resolution, the terms need to be well-defined, and it must be made clear what the issue is and how this is not already mitigated by the fact that the display is certified (including non- (E)TSO parts), or in the case of non- (E)TSO parts), or in the case of non- (E)TSO parts), or in the case of non- (E)TSO parts), or in the display was installed as a minor/major change (STC).	No	Yes	Not accepted.	Altho inforr areas even What traffic needs requin in mo functi The q ETSOS for th such i by de instal
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ugh modern displays indeed provide more nation that the 'classic' PFD and ND, the specific of these displays are still being referred to as such, on highly integrated displays.

this statement intends to state is that if FLARM : is provided on an integrated display, the Agency s to be involved. We consider that the impact of this rement will be limited, since we should be involved st changes that introduce or considerably alter ons on the primary flight display(s).

uestion of whether or not the display meets several s is not relevant as there are no specific standards e display of FLARM traffic on these displays and as t would be considered a non-ETSO function, which finition will have to be assessed at aircraft lation level.



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				related to the installation but to the certification of the display. It is true that technically a display does not need any (E)TSO and that the responsibility to ensure this lies with the installer or design organization, but in practice we don't know of any ND installed in certified aircraft that does not have several (E)TSOs. Furthermore, even if the display is not (E)TSOed, containment mechanisms ensuring primary information availability will be assessed as part of the minor/major change (STC) when the display itself is installed, not when FLARM is connected to it. For (E)TSOed displays, it is part of the certification process to ensure that (E)TSO functions are not negatively affected by non-(E)TSO functions.						
5	Airbus Helicopters	Section 3 subsection a	8	As per previous AH comment on the initial CM, the restriction in chapter 3 a) " presentation of the FLARM information on a PFD or a ND cannot be accepted within a minor change classification per Part 21.A.91 for night VFR or IFR certified aircraft." May cause some inconsistencies with the current GM 21.A.91 application where the worst failure condition on the display on which FLARM is integrated may already be classified as having minor safety effects, and the associated modification be classified as Minor as per Part 21.A.91	It is suggested to adapt the sentence to: " presentation of the FLARM information on a PFD or a ND can only be accepted as part of a minor change as per Part 21.A.91 if a reassessment of the display, on which the FLARM indication will be presented, is demonstrated to not require a higher failure condition classification than minor, e.g. obstruction of primary flight information by FLARM depiction scheme. In all other cases the safety assessment of the complete system will adjust the failure condition classification to be fulfilled."	Yes	No	Partially accepted.	The i insta emb helic and i prese Class	



intent is understood and supported for certain allations that have such containment mechanisms bedded. However, not all applicants and previous copter designs have such controlled architectures therefore, it can not be assumed that correct sentation will be implemented in the whole industry. sification will have to be a case-by- case basis.

EASA response



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6	Airbus Helicopters	Section 3 subsection c	8	Since the FLARM aural alerting is declared as "must be justified as to its prioritization and appropriateness for the type of aircraft installed" the expected aural alerting sequence should be specified.	Beyond HTAWS / TCAS approved prioritization schemes, it is suggested to include the following detailed specification: Appropriate aural alerting includes the following content and order: <alert tone=""> <direction> <altitude> <object type=""> <distance> <alert tone="">: FLARM aural alerting shall include a peep or siren tone for clear differentiation <direction>: The direction is output as per position of hour hand (e.g. 12 o'clock) <altitude>:</altitude></direction></alert></distance></object></altitude></direction></alert>	Yes	No	Not accepted.	The p and it shoul
7	Airbus Helicopters	Section 3 subsection e	8	Adequate protection of basic regulation systems, equipment and appliances not required for type certification or by operating rules is not mandatory	Reformulate section 3 subsection e, as proposed below: QUOTE Allow for adequate protection of all installed interfaced equipment with hazard classification higher than major. UNQUOTE	Yes	Yes	Partially accepted.	The A but d 'majo
8	Airbus Helicopters	Section 3 subsection e	8	The separation addressed in 3 e)2. should be precised: "can be rapidly disconnected in case of emergency. A single switch for a complete system disconnection (including its displays and sensors) is one of various design solutions."	It is suggested to adapt the sentence to: "The installation on the aircraft shall be in a way, so that any disturbance can be rapidly eliminated, especially in case of emergency. A single switch for the elimination of the disturbing source is one of various possible design solutions."	Yes	No	Not accepted.	The A clear pleas avoid



proposal may be considered as too design specific it is not within our remit to prescribe how a system ld be designed.

Agency concurs that the sentence may be improved, loes not agree to include the relationship with the or' failure classification.

Agency considers the current text to be sufficiently . In addition, the particular item has been revised, se see comment 23, maintaining the intent but ling design-specific implementations.



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9	Airbus Helicopters	Section 3, other considerati ons c	9	Due to different ground/flight characteristic of fixed wing and rotorcraft respective criteria should be added.	It is suggested to add "means for adequate ground/flight logic for rotorcraft applications".	Yes	No	N/A	The t
10	Airbus Helicopters	Section 3 subsection f	8	Since EASA guidance states that "Antenna installation should not produce unacceptable failures in detecting incoming traffic" detailed statement should be added in order to define "unacceptable".	It is suggested to replace "unacceptable" by "no blind spots"; Antenna installation should not show any blind spots when detecting incoming traffic"	Yes	No	Partially accepted.	"No with are p equij that there mask Oper
11	Airbus Helicopters	Section 3 subsection g	9	[] it must be clearly stated in the flight manual that the approval of this equipment is restricted to the areas where telecommunication regulations allow the use of the transmissions on the used frequency.	FLARM is a Short Range Device (SRD) application. SRD allocated frequencies are not within ICAO spectrum and their usage according applicable national regulations is to be considered.	Yes	No	Not accepted.	For t whet uses requ telec
12	Airbus Helicopters	Section 3 subsection h	9	IFR certified aircraft reference may be refined	Reformulate section 3 subsection has proposed below: QUOTE [] in particular for IFR type certificated aircraft UNQUOTE	Yes	No	Accepted.	The t
13	Airbus Helicopters	Section 3 subsection h	9	Other considerations are incorrectly numbered	Renumber correctly the paragraphs under Other considerations	Yes	No	Accepted	The I



text to which the comment refers could not be found.

blind spots" is almost impossible on a helicopter massive structures like gearboxes. All helicopters practically certified to include externally hanging pment that obstruct signals. However, it is agreed "unacceptable" may be wide to interpretations and efore it will be changed to "large areas of". The king implied is explicitly provided as justification. rationally, this can be appropriately managed.

the intent of the sentence it does not a matter of ther the device is a short range device or whether it an aviation protected frequency. RF transmissions ire implicit or explicit authorisation from the communications regulator.

text has been revised in accordance with the estion.

numbering has been revised.



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14	Airbus Helicopters	Section 3 subsection h	9	Other considerations first paragraph b) A certification memorandum cannot impose a requirement to define DQR. Reference to the appropriate regulations enforcing this requirements should therefore be included in the certification memorandum. This is difficult to understand that a database is part of the type design but not certified. Furthermore, this means that together with paragraph c) under other considerations, the databases should have a part number if belonging to the installation. Not all applicants may be familiar with the subject that is further detailed in dedicated EASA Certification Review Items (CRI) on aeronautical databases.	EASA to clarify the applicable requirements regarding the databases used by FLARM.	Yes	Yes	Not accepted.	The r clarif
15	Airbus Helicopters	all	all	Pages header indicates CM-AS-001 instead of CM-AS-010	Renumber correctly the CM in the headers	Yes	No	Accepted	The r
16	ADAC Luftrettung gGmbH			First of all we would like to point out, that we were really appreciated that Certification Memorandum AS-010 Issue 01 Revision 01 has been reopened. Due to some Near Miss Reports, that has been reported by our Flight Crews, our Safety Board has started a Company "Safety Action Group" in 2017. One of the outcomes of this Action Group is the need of a totally new design of our Company's Traffic Alerting System. Presently we are working on a - so called by us - "Single Traffic Alerting Display". Due to that we are glad to get the chance to do some comments on the Memorandum.		No	No	Noted.	Than



requirements for the use of databases will soon be fied in CM-AS-009.

numbering has been revised.

ık you.



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17	ADAC Luftrettung gGmbH	2.2	7	Due to the reason that we operate only CS- 27 and CS-29 aircraft, we are not affected by CS-23 aircraft rules. Nevertheless we would like to signify our opinion that we are highly interested that as much aircraft as possible should be equipped with FLARM. Therefore in our opinion it does not make sense to include CS-23 aircraft. Today lot of installations in light aircraft are installed under the "no safety effect" hazard classification. Additionally to that most of this FLARM installations include aural warnings. In our operation we found out, that the installation of a collision avoidance system without aural warnings makes no sense, since the Flight Crew will not monitor the FLARM - or other Traffic Displays – continuously. If CS-23 aircraft will still be included in this Memorandum, it may result in much less installations on these aircraft than today, because they usually use aural warnings that are designed and installed under the no safety effect hazard classification.	Our proposal is to change the third paragraph in section 2.2 as follows: Similar considerations apply to the integration of the aural alerting in CS 23, 27 and 29 aircraft that some of the FLARM systems may generate. Upon an aural alert the pilot is expected to confirm the disturbing traffic, if time permits, and/or apply appropriate airmanship practices for VFR -VMC flight. In terms of hazard classification, the aural integration is the most aggravating factor elevating the hazard assessment to a minor level in CS-27 and CS-29 aircraft.	Yes	No	Not accepted.	Plea



ase see our response to comment 4 for the rationale.



	Comr	nent		Comment summary	Suggested resolution	Comment is	Comment is	EASA	
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18	Avidyne	2.2 par 2	7	We believe that making the FLARM traffic mentally separable is a secondary, and perhaps faulty, consideration. We believe that differentiating FLARM traffic may actually "result in confusion, increase the head-down time as well as reduce valuable time to appropriately scan the airspace for conflicting traffic."	Although the FLARM traffic source is not certified, the data it provides is similar to other traffic sources. At a very basic level, from a pilot's perspective traffic data is traffic data. While it may seem beneficial to make the pilot aware of the difference between FLARM and other traffic indications, simply having this one extra piece of information adds another level of complexity. The pilot has one more thing to think about when deciding how to responding to a traffic alert. The additional information actually increases head-down time, increases pilot workload, and delays pilot response to the condition. Commonality is generally simpler from an operator perspective. Note that a single hybrid display of traffic minimizes the use of FLARM for depiction and alerting anyway since FLARM would only be utilized if no better source of data is available for the target. Avidyne recommends removing or minimizing the requirement for visual differentiation.		Yes	Not accepted.	We con and tha differen Howeve how the other in In this s principl differen non-val
19	Avidyne	2.2 par 4	7	Avidyne understands the need for "further review, including a Safety Assessment", but we disagree that it should automatically be declared a Major criticality.	Recommend changing this paragraph to read "Conversely, if the integration is not performed as per section 3 then the Agency may request further review, including a Safety Assessment, to determine whether the installation criticality level should be increased to Major criticality."		Yes	Not accepted.	Please s



EASA response
ncur that traffic information is traffic information at from a pilot perspective there is little nce.
er, some traffic information could, depending on e situation evolves, result in an alert whereas nformation may not.
sense, the CM consistently follows the same le that has been applied in ACAS, for the ntiation of display of validated (Mode-S) versus lidated (ADS-B only) positioning data.

se see the response to comment 4 for rationale.



Comment				Comment summary	Suggested resolution	Comment is	Comment is	EASA	
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20	Avidyne	3.a	8	We believe that making the FLARM traffic mentally separable is a secondary, and perhaps faulty, consideration. We believe that differentiating FLARM traffic may actually "result in confusion, increase the head-down time as well as reduce valuable time to appropriately scan the airspace for conflicting traffic."	Although the FLARM traffic source is not certified, the data it provides is similar to other traffic sources. At a very basic level, from a pilot's perspective traffic data is traffic data. While it may seem beneficial to make the pilot aware of the difference between FLARM and other traffic indications, simply having this one extra piece of information adds another level of complexity. The pilot has one more thing to think about when deciding how to responding to a traffic alert. The additional information actually increases head-down time, increases pilot workload, and delays pilot response to the condition. Commonality is generally simpler from an operator perspective. Note that a single hybrid display of traffic minimizes the use of FLARM for depiction and alerting anyway since FLARM would only be utilized if no better source of data is available for the target. Avidyne recommends removing or minimizing the requirement for visual differentiation.		Yes	Not accepted.	Pleas
21	Avidyne	3.a	8	The word "solid" seems superfluous."	Remove the word "solid".		Yes	Partially accepted.	'Solio



se see our response to comment 18 for the nale.

d' has been replaced with 'robust'



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22	Avidyne	3.a	8	The CM indicates the need to evaluate the "display containment mechanisms ensuring primary information availability." We agree with this position; however, we disagree that this should automatically force the change to be classified as Major.	It is commonplace to display traffic information on Navigation Displays and Primary Flight Displays. As such, these displays already provide appropriate containment mechanisms for traffic data to assure availability of the primary information. Avidyne believes that it is not only appropriate, but is preferable to display traffic in a manner and location where the pilot is already accustomed to seeing it. In a situation where a hybridized display of traffic data (including FLARM traffic) is being provided over an existing interface and in an already supported format there is no reason to automatically classify the change as Major. Avidyne believes that this is especially true when the source of traffic data is TSO approved equipment with functions to receive and hybridize the FLARM traffic data with the TSO-approved traffic data. In this case the display is receiving and displaying traffic in an already approved format from an already approved device. Avidyne recommends changing the last two sentences of this section to read "When an installation involves the display of FLARM traffic on a Navigation Display (ND) or Primary Flight Display (PFD) using previously unapproved interfaces or protocols, then an assessment of the display containment mechanisms ensuring primary information availability must completed. In these situations presentation of the FLARM information on a PFD or a ND cannot be accepted within a minor change classification per Part 21.A.91 for night VFR or IFR certified aircraft."		Yes	Not accepted	Pleas



se see our response to comment 4 for the rationale.



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23	Avidyne	3.e.1	8	The intention of the first sentence is unclear, but it appears that this is requiring a dedicated physical switch to disconnect the FLARM equipment power. We don't believe that this dedicated physical disconnect is necessary.	The environmental requirements of section 3.d include those tests to verify compatibility with other aircraft functions (including aircraft power), and to assure the safety of occupants. It seems excessive to require a dedicated power switch for just the FLARM system. Avidyne recommends changing the first sentence to read, "should be protected by its own circuit breaker."		Yes	Partially accepted.	The t mech as su unsta pull. even
24	Avidyne	3.e.2	8	We agree that the FLARM system should be easily disabled at any time. However, we do not believe that this needs to be accomplished by any form of physical disconnection.	Avidyne believes that a logical/functional disconnect is adequate (non-physical disconnect), so we would like to recommend that the first sentence be changed as follows, "can be rapidly disabled or disconnected in case of emergency."		Yes	Accepted.	The t sugg
25	Avidyne	3.f	8	This requirement is excessive given the fact that the FLARM is non-required, non- certified supplemental situational awareness.	Remove this requirement.		Yes	Not accepted.	This that does

* Please complete this column using the word "yes" or "no"

** Please complete this column using the word "yes" or "no"



EASA response

text implies that a rapidly available disconnection hanism should be available, and it will be amended ich. Please note, a circuit breaker in a (typically) able rotorcraft may be too difficult to locate and/or In addition, for some manufacturers CBs are not located in a reachable location by the pilot.

text has been revised in accordance with the estion.

requirements relates to CS XX. 1301(d). The notion the installation of the equipment is non-essential not imply that 1301(d) need not be complied with.