Disposition of Public Comments on Draft Policy Statement Anm-01-111-165, Certification of In-Seat Power Supply Systems

The final policy has been substantially reorganized. Therefore, a reference to a particular item contained in the draft policy may be located in a different paragraph in the final policy.

No.	Commenter	Comment	Disposition
1	General Dynamics/ Air Transport Association (Fernon Clark)	In paragraph (a), delete "The design of the ISPSS socket should be such as to prevent the ingress of fluid into the power sockets." Comment: As this is an installation requirement, not a product design issue.	Don't concur: Part 25 certification is concerned with system design and installation at the product level. The location and orientation of the ISPSS socket is part of the certification of the ISPSS
2	The Boeing Company	In paragraph (a), delete "The design of the ISPSS socket should be such as to prevent the ingress of fluid into the power sockets." Comment: This is a specific method of showing compliance to the requirements of paragraph a. that state: "The ISPSS should be designed to provide circuit protection against system overloads, smoke and fire hazards resulting from intentional or unintentional system shorts, faults, etc. . . ." The intent of this statement is most commonly met by demonstrating that no hazard occurs as a result of fluid ingress (See test procedure of TRCA document DO-160D, sections 10 and 11)	Partially concur: The FAA agrees that designing the sockets to prevent the ingress of fluid is one way to show that no hazard would occur. By definition policy provides a means of complying with the applicable regulations , not the only means by which compliance may be demonstrated. An applicant may propose alternative methods of compliance than those detailed in the policy memorandum. The test procedures referenced could fall under 'it should be shown that design means are in place to mitigate the hazard' as stated in the policy.
3	General Dynamics	In Item (a), paragraph 4, "The hazard to the aircraft occupants of tripping over the PED lead wire should be addressed in the design of the ISPSS connector and installation." Question: How? Quick release? Can this be quantified? This is design requirement for the manufacturer of the adaptors.	Concur: the statement has been modified and moved to Section 3 of the policy memorandum titled "Operational Considerations."
	General Dynamics	In Paragraph (a), paragraph 5, "If an	Response: The policy statement is concerned

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4		automatic overheat protection feature is employed by the ISPSS, then this feature should not be able to be reset in flight." Question: Is the issue concerning "safety overheat" or "reliability"? This would determine the method for reset.	with "safety overheat" because of the possibility that overheated components could be a fire hazard. Note: see disposition for comment 5.
5	The Boeing Company	In Paragraph (a), revise:, "If an automatic overheat protection feature is employed by the ISPSS, then this feature should not be able to be reset in flight." To: If an automatic overheat protection feature is employed by the ISPSS, then this feature should not be automatically resettable.	Concur: The final policy has been revised as requested.
6	Air Transport Association (Fernon Clark)	Page 2, section a: "Our current system has automatic overheat protection, but does reset if the temperature drops below a threshold. It should be okay to reset in flight."	Partially concur: The system should not automatically reset in flight as the condition which caused the system to overheat may not have been determined/resolved. However, the system can be designed to be manually reset by a crew member. The final policy has been revised to reflect this.
7	General Dynamics and The Boeing Company	In paragraph (a), replace "The ISPSS should be powered from a non-essential power supply (bus) of the aircraft" With: "The ISPSS should be powered from a bus with on/off control as specified in FAA Interim Policy Guidance 00-111-160." Comment: This requirement is covered in much more detail in FAA Interim Policy Guidance 00-111-160, dated September 18, 2000. This details a discussion of the intent of such a requirement and discusses various ways of satisfying the intent.	Partially Concur: Concur with the need for a more detailed explanation of the subject paragraph. This paragraph has been expanded using the reference guidance to include a more detailed discussion of the need to protect essential power sources from faults caused by non-essential systems such as in-flight entertainment systems and PSS for PED. Therefore a reference to the policy on IFE is not required. This helps avoid confusion when applying this policy.
8	General Dynamics and The Boeing Company	In Item (a), paragraph 7, In addition, appropriate quantitative and/or qualitative failure analyses of each	Concur: The final policy has been revised.

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		installed ISPSS should be conducted such that any likely failure condition would not reduce aircraft safety nor endanger the occupants. The analysis should consider the effects of the environment in which any ISPSS equipment is installed, the cooling arrangements and the safety features employed to prevent a fire or overheat condition from being inadvertently created. Add "within the ISPSS" to the end of the sentence. Comment: The system cannot control overheat in other systems or attached personal electronic devices (PEDs).	
9	Weber Aircraft, LP	Paragraph a, subparagraph 7: Change:" In addition, appropriate quantitative and/or qualitative failure analyses of each installed ISPSS should be conducted such that any likely failure condition would not reduce aircraft safety nor endanger the occupants. The analysis should consider the effects of the environment in which any ISPSS equipment is installed, the cooling arrangements and the safety features employed to prevent a fire or overheat condition from being inadvertently created. To: In addition, appropriate quantitative failure modes and effects and/or qualitative analyses of each installed ISPSS should be conducted and utilized to eliminate such that any likely failure condition that would not reduce aircraft safety nor or endanger the occupants. The analysis should consider the effects of the environment in which any ISPSS equipment is installed, the cooling arrangements and the safety features employed to prevent a fire or	Don't concur: FMEA is not a requirement but it can be used to satisfy § 25.1309 The purpose of the this portion of the policy is to highlight those items that should be considered to meet the requirements of 25.1309. There are various methods available to conduct the appropriate failure analysis, the FMEA is one of those methods

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		overheat condition from being inadvertently created. Comment: A minimally acceptable reliability and safety engineering design effort for commercial transport equipment should automatically require the use of a failure modes and effects analysis (FMEA). Therefore, this type of analysis should be readily available for review and consideration. In addition, the nature and thoroughness of an FMEA is usually indicative of the equipment reliability and safety design integrity. It should also be note that use of the word "qualitative" to define this statement of policy requirement may result in inferior equipment being installed in aircraft.	
10	General Dynamics	In item (b), paragraph 1, "The ISPSS should be designed so that it may be de-powered at any time." Question: Is this referring to just the individual ISPSS or power to the entire system.	Response: This approval condition is referring to the ability to quickly de-power the entire PSS for PED when necessary, not just individuals outlets
11	Weber Aircraft, LP	Revise paragraph b. as shown: "The ISPSS should be designed so that it may be de-powered at any time. A clearly labeled and conspicuous means (on/off switch) of de-powering the ISPSS should be provided as a minimum for the cabin crew. Cabin configurations may allow for the provision of more than one switch in the cabin. If multiple switches are used, a serial configuration to prevent re-activation of the ISPSS by crew members unaware of a hazardous or potentially hazardous condition of the system.	Concur: The intent of this approval condition was to ensure that the flightcrew had only a single action to perform in order to de-power the ISPSS if flight deck control was provided. The policy has been revised to provide clarification.

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		Reason: The use of multiple on/off switches, not in a serial configuration, in various locations of the aircraft could allow one crew member to turn the system back on after it was turned off by another crew member because of a serious electrical problem or misuse by a passenger.	
12	Weber Aircraft, LP	Revise Paragraph b, subparagraph 2 as follows: An additional switch may also be provided in the flight deck. This de-powering feature should allow for the immediate removal of power to all seat outlets (because circuit breakers are not to be used as switches, their use for this purpose is not acceptable) and should be in a serial configuration with the cabin switch(es). The ISPSS should be deactivated during critical phases of flight such as take-off and landing. Reason: See "Reason" for previous comment. Also, it is hereby recommended that a flight deck on/off switch be made mandatory. In the event of a flight system malfunction, a flight deck ISPSS on/off switch would allow the flight crew to determine if the ISPSS or the PED's connected to it are the source of the malfunction. In addition, it should not be the responsibility of the cabin crew to insure that ISPSS is de-activated during critical flight phases.	Partially Concur: The policy has been revised to clarify the need for a single switch that can remove power from the entire system, regardless of other PSS for PED switches. However the location of that switch does not have to be on the flight deck. This provides flexibility for system design while meeting the need for a single switch.
13	General Dynamics	In item (b), paragraph 2, "An additional switch may also be provided in the flight deck. This de-powering feature . . ." Comment: ISPSS does not know flight phase. ISPSS vs. System. Control vs. deactivate vs. remove power. Clarify conditions under which control power are removed.	Response: The intent of this approval condition is that the PSS for PED power can be de-activated by the flightcrew when they deem it necessary for safety or other operational reasons and that the flight deck switch can override any cabin located PSS for PED power switch.

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14	General Dynamics and The Boeing Company	In item (b), remove the sentence "The ISPSS should be deactivated during critical phases of flight such as take off and landing." Comment: This statement is an operational consideration which should not be addressed under Title 14 Code of Federal Regulations, Part 25.	Partially Concur: The FAA agrees that this is an operational consideration. The policy is amended to add a note stating that this is an operational consideration and not a condition for part 25 certification of the PSS for PED, refer to Section 3, paragraph b. However, restricting the use of PSS for PED during critical phases of flight would ensure these passenger convenience items would not present a source of interference to essential airplane systems necessary for the safe operation of the airplane during TT&L.
15	Raytheon Aircraft	Paragraph b: Paragraph b of "ISPSS Approval Conditions" states that the ISPSS should be deactivated during critical phases of flight such as takeoff and landing. The policy does not dictate whether the crew accomplishes the deactivation. Question: Is it acceptable to request passengers to disconnect from the ISPSS during these phases . . . RAC recommends that deactivation of the ISPSS should be accomplished by passenger action.	Response: As stated in the response to Comment 14, this procedure is not a necessary condition that must be complied with prior to part 25 certification. It is an operational consideration and the appropriate operating rules (e.g., parts 91, 122, 125, 129) regulate use of this type of equipments during certain flight phases.
16	Air Transport Association (Fernon Clark)	Page 2, section b: "The ISPSS can be active during take off and landing. The use of the system is controlled by the cabin crew."	See response to comments 14 and 15
17	General Dynamics	In item (b), paragraph 2, "If flight deck indication of ISPSS status (system "on" or "off") is deemed necessary, then the indication should be consistent with the airplane manufacturer's design philosophy with regard to system status indication. Comment: Delete this paragraph, this is an airframe requirement.	Don't concur: Approval of the ISPSS is not given to the system itself but as the system is installed in the airplane. This approval condition addresses fundamental human factors considerations when modifying an existing design. Aircraft modifiers need to be aware of the manufacturers design philosophy in regards to flightcrew annunciations so they do not modify or add annunciations that could lead to crew confusion.
18	Weber Aircraft, LP	Revise Paragraph b from: If flight deck indication of ISPSS status (system "on" or "off") is deemed necessary, then the indication should	Concur: The policy has been revised to state that consideration should be given to providing a system status indication at each switch. It further states this is a desirable, but not required

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		be consistent with the airplane manufacturer's design philosophy with regard to system status indication. To: If flight deck indication of ISPSS status (system "on" or "off") is deemed necessary, then the indication should be consistent with the airplane manufacturer's design philosophy with regard to system status indication. If multiple switches are used, an ISPSS status indicator shall be provided at each switch location.	feature, that would allow cabin crewmembers to determine if problems associated with an individual passenger outlet are related to the localized components (e.g., seat mounted components) or the system as a whole and being able to address any potential safety issues quickly.
19	General Dynamics and The Boeing Company	In item (b), revise "The overall control of the system should be with the flight and/or cabin crew. If the control is by a cabin switch only, then airplane flight manual, operations manual and/or cabin crew operating procedures should be provided . . ." To: "The overall control of the system should be with the cabin and/or flight crew. Flight attendant manual or cabin crew operating procedures should be provided. If an additional flight deck switch is provided, then appropriate operating information should be provided to the flight crew." Comment: The predicating cause should not be attached to the changes in flight manuals; they should be amended as appropriate regardless of switch configuration or location. This policy seems to be primarily addressing "cabin switches" with control provided by the cabin crew.	Concur: The policy has been revised to state: " Procedures for the use of such switches should be documented in the appropriate crew operating/training manuals."
20	General Dynamics	In Item (b), paragraph 5, Selections 4 and 8 Comment: "delete."	See response for Comment 21
21	The Boeing Company	Delete: Paragraph b.(4) which	

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		states: "Use of compatible adapters and use of compatible equipment." Delete: Paragraph b.(8) which states: Information to passengers, such as safety precautions and warning that in-seat power may be disconnected at any time, if necessary, without notice." Comment: Paragraph b.(4): List or descriptions of equipment suitable for use on aircraft more appropriately reside within 14 CFR part 95 or 121. Comment: Paragraph b.(8): These items are instructions to a passenger, which are best addressed by individual airlines' operations manuals. These are out of the purview of system manufacturers and installers, and should not be addressed under 14 CRF part 25.	Partially Concur: We concur that these items are best addressed by individual airlines. Item 4 has been removed from the list which now resides in Section 3 "Operational . This is because the final policy no longer addresses "compatible adapters." However, Item 8 is retained and is included under operational considerations. It is important to identify that the policy is amended to add a note stating that these are for operational consideration and not a condition for part 25 certification of the PSS for PED.
22	General Dynamics	In item (b), paragraph 6, ". . . consideration should be given to automatic deactivation of the ISPSS in the event of a rapid decompression of the aircraft cabin." Comment: This would be a requirement by the Airframe manufacturer. More detail is requested. Our system contains this feature by design and installation requirements.	Don't concur: An applicant is required to show that a product complies. Part 25 policy does not delineate responsibilities. In addition, this consideration is a long standing policy (refer to AC 25-10) and is concerned with the possibility of arcing in high voltage circuits under rapid decompression situations.
23	Air Transport Association (Fernon Clark)	Page 5, section n: "Our current systems do not automatically deactivate during a rapid decompression. Delete this requirement as the system is controlled by the cabin crew switch.	Don't concur: This is a long standing policy (refer to AC 25-10) and is concerned with the possibility of arcing in high voltage circuits under rapid decompression situations.
24	General Dynamics	In item (d) revise: "The ICAW should include maintenance actions necessary to ensure…" Comment: Need to be reworded; intent of paragraph is not clear.	Concur: The intent of this paragraph is to ensure the continued airworthiness of the installed ISPSS system by highlighting certain aspects of the system that may need future maintenance. The policy has been revised to clarify this. (Also refer to the response for

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			Comment 25)
25	The Boeing Company	In Paragraph d, Replace: The ICAW should include maintenance actions necessary to ensure the continuing effectiveness of ISPSS system features . . .” With: Analyses should be provided which demonstrate that all safety devices not specifically addressed by the ICAW are sufficiently reliable to show there is no unacceptable hazard to the aircraft occupants or crew [ref. 14 CFR § 25.1309(b), (d), and (g)] Comment: The analyses referenced in § 25.1309 are a widely accepted manner of demonstrating the lack of hazards to passengers and crew. Maintenance provisions should only be employed if the required reliability levels of safety –related devices cannot be demonstrated.	Don’t concur: The intent of the paragraph (Section 1, paragraph j of the final policy) is to ensure that the requirements of § 25.1529 are addressed. Often applicants assume that § 25.1529 does not apply to non-essential systems, when in fact it does. That does not necessarily mean that ICAs will be necessary for any particular PSS for PED, but the decision, one way or another, must be addressed per the requirements of § 25.1529.
26	The Boeing Company	In paragraph d: concerning Instructions for Continued Airworthiness (ICA), to indicate that the described procedures are for a non-essential systems. Comment: The electromagnetic interference (EMI) issue relates to noise affecting essential or critical systems. This is the first time Boeing is aware of the ICA being applied to non-essential systems. This could be a massive undertaking for future maintenance of filters, shields, etc.	See response to comment 25
27	General Dynamics	In item (e), delete whole paragraph. Automotive style outlets are currently approved. Question: What is the intent of the paragraph?	Response: This wording has been removed from the final policy and replaced with a more generalized discussion about the need to protect passengers from shock hazards.
28	General Dynamics	In item (f), ISPSS Power Limitations	Concur: This paragraph as been removed from

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	and The Boeing Company	– "delete – Applicants for installation approval should submit substantiation of proposed maximum power as being non-hazardous to passengers." General Dynamics Question: Is the intent to focus on current over time? Boeing Comment: Almost all power levels might be hazardous to passengers or crew if appropriate current limitation are not enforced. Focus should be on safety devices that limit the exposure time of a person to a power level. (In other words, focus should be on the maximum energy delivered during a ground fault).	the final policy.
29	Raytheon Aircraft	Paragraph f: Paragraph f . . . states that the maximum wattage should be limited to 100 watts. The 100 watt limit is too low, as it is not enough to power the standard laptops in use today. RAC recommends a 1000 watt maximum limit. In addition, paragraph f states that the applicant should submit substantiation of proposed maximum power as being non-hazardous to passengers. 100 watts can be hazardous to passengers, but the guidelines in this policy are adequate to minimize hazards to passengers (output power not being available until the PED is correctly mated with the socket).	Concur: The FAA concurs that the current generation of laptops sometimes require in excess of 100 watts of power to properly function. However, the FAA believes that 200 watts of power is more than sufficient to power current and future generations of laptop computers. The final policy has been revised to include this new power limit when evaluating the intended function of the outlets. The final policy also states that in specific cases where higher power levels are necessary the applicant should submit to the cognizant FAA rationale as to the need for the increased power requirements and the additional design features that will minimize the possibility of adverse affects on essential or critical airplane systems and the shock hazards to persons. (Also see response to Comment No. 28
30	Weber Aircraft, LP	Revise Paragraph f., subparagraph 1 from: ISPSS Power Limitations - Applicants for installation approval should submit substantiation of proposed maximum power as being non-hazardous to passengers. Regardless of the level of substantiation, the maximum power available at each seat outlet should be limited to 100 watts.	Don't concur: Although the purpose for the power outlets is to power personal electronic devices, such as laptops, the current generation of laptops sometimes require in excess of 100 watts of power to properly function. The policy raises the power output level to 200 watts to accommodate current and future generation laptop computers or a means to submit rationale to the FAA if higher power levels are needed.

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		To: ISPSS Power Limitations - Applicants for installation approval should submit substantiation of proposed maximum power as being non-hazardous to passengers. Regardless of the level of substantiation, the maximum power available at each seat outlet should be limited to 75 watts.	
31	General Dynamics	In item (g), each ISPSS should be designed to prevent any radiated or conducted EMI to critical or essential aircraft systems. If filters are used to accomplish this, then the effect of static discharge should also be addressed. Comment: Remove "any" radiated and replace with any "ISPSS radiated." The system cannot control other systems.	Concur: The paragraph is intended to apply to EMI emissions from the PSS for PED. The policy is revised to add "radiated or conducted emissions from the PSS for PED" to clarify the meaning of the paragraph.
32	Weber Aircraft, LP	Paragraph g:, subparagraph 1: Each ISPSS should be designed to prevent any radiated or conducted EMI to critical or essential aircraft systems. If filters are used to accomplish this, then the effect of static discharge should also be addressed. Comment: The intent of the second sentence is unclear. Does it refer to the effects of static discharge on the filters or the effects of static discharge created by the filters on other equipment.	The policy has been revised to clarify the intent of this paragraph as follows: Section 1, paragraph (c) now states, in part: "When considering the effect of PSS for PED on critical systems, §§ 25.1353 and 25.1431, radiated or conducted emissions from the PSS for PED must also be considered. If filters are used to accomplish this, then the effect of human-generated electrostatic discharge damage to the filters should also be addressed. . ."
33	General Dynamics and The Boeing Company	In item (h), provide clarification why complex loads are more appropriate for system testing. Comment: Generally PED loads are close to resistive loads. A more difficult yet more useful test is one that uses loads that demand a high harmonic content. This is more consistent with PED adapter power supplies.	Partially concur: The policy has been revised from "simulated complex loads…" to "simulated PED loads…"

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34	General Dynamics and The Boeing Company	In item (h), paragraph 4, Delete "This should be followed by tests with the intended PED's . . ." Boeing Comment: The type and kind of devices is the responsibility of the operator. The actual devices will vary from region to region and flight to flight, and will change with time due to the evolution of PEDs. This being the case, it is counterproductive to actually test the system with PEDs. A better indication of system performance would be to apply a standardized load and monitor system characteristics (e.g., electromagnetic emissions, power consumption, thermal characteristics, load management, etc.)	Partially concur: Although the types of devices change and evolve over time there is still benefit to testing the systems with the actual intended devices installed. However, this is not a requirement for certification. The final policy has been amended to read: Additionally, tests with the intended PED connected to check the conducted interference from the PED (30-100 MHz) may be conducted, but is not required for certification. Testing for compliance to 25.1353 and 25.1431 are covered by DO-160D as applicable.
35	The Boeing Company	Comment: Move paragraph h. to be a subsection of the first part of paragraph g. Paragraph h. is not a requirement, but is a method of showing compliance with the requirement described in the first paragraph of paragraph g.	Concur: The final policy has been revised to combine these two paragraphs and is now in Section 1a of the final policy. This policy does not impose requirements, it provides a means to comply with the applicable requirements of 14 CFR Part 25.
36	The Boeing Company	In paragraph i. revise the phrase that reads: ". . should be physically separated from other aircraft wiring and wire bundles." To: ". . . should be appropriately separated from other aircraft wiring and wire bundles." Comment: If it can be demonstrated that EMI filters are reliable and effective, and power bus separation requirements are met, then physical separation does not provide additional safety and unduly burdens systems installers.	Partially concur: The wording the commenter wants removed has been deleted from the final policy. The final policy makes reference to FAA Policy memorandum PS-ANM111-2002-01-04, System Wiring Policy for Certification of Part 25 Airplanes to stress the importance of properly installed and protected wires to ensure safe operation. Also the final policy contains a paragraph titled "Wire and Component Vulnerability" that states the need to have engineering data that controls the installation of PSS wiring and equipment that it needs to contain specific, unambiguous requirements for the routing, supporting, and protection of all PSS wiring and equipment, and must identify all parts necessary to accomplish those installations. Refer to Section 1(a)(3) of the final policy.
37	The Boeing Company	Modify paragraph i. to allow testing in accordance with certain sections	Concur: The final policy has been revised to reflect the commenter's request.

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		of RTCA DO-160D, but not to require that it be in accordance with all the section listed in that paragraph. Change the text to read as follows: system testing should be accomplished in accordance with appropriate chapters of RTCA DO-160D/EUROCAE ED-14D/ISO7137. These may include sections 4 through 9, 11, and 15 through 22. Comment: the lightning testing of section 22 of the RTCA document, for example, may not be appropriate for every type of airplane installation.	
38	The Boeing Company	Comment: Move paragraph i. to be a subsection of the first part of paragraph g. Paragraph i. is not a requirement, but is a method of showing compliance with the requirements of the first paragraph of paragraph g.	Concur: The final policy has been revised to combine these two paragraphs and is now in Section 1 of the final policy. This policy does not impose requirements, it provides a means to comply with the applicable requirements of 14 CFR Part 25.
39	General Dynamics	In item (i), revise "Systems testing should be accomplished in accordance with appropriate chapters of RTCA." Question: Test levels to be defined by who?	Response: Although the specific phrase that the commenter has the questions about has been removed from the final policy, it is the applicants responsibility to propose to the cognizant FAA office which tests they believe are applicable for their particular system.
40	General Dynamics	In item (j), revise: "To guard against damage to ISPSS cable assemblies installed in the seat itself, seat mounted wiring should have appropriate protection means such as protective conduits. Delete: "such as protective conduits." Comment: If wire separation requirements are met, then physical separation does not provide additional safety and unduly burdens system installers.	Partially concur: The intent of this paragraph is to ensure that seat mounted ISPSS system wiring is protected against the harsh physical environment around and on passenger seats. Many examples exist of modifiers coiling extra wires under passenger seats, leaving loose wires hanging below seat cushions that could be damaged from passengers feet and carry on items, and having wire exposed on the cabin floor around the seats. These are just some examples of the need for wire protection in this area. The concern is passenger shock and fire possibilities, not with the functionality of the system. The use of conduits is not mandatory, it is provided as one example of how seat mounted

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			wiring can be protected. However, the final policy has been revised to clarify this point.
41	The Boeing Company	Revise paragraph i. to delete the 2nd and 3rd sentences which state: "Testing for conducted emissions should include 150 kHz to 30 MHz as depicted in section 21 of document DO-160D. Additionally, the conducted emissions. . . should be continued up to 100 MHz." Comment: Deletion of those sentences will make the requirements of conducted emissions consistent with those applied to all other airborne equipment qualified per RTCA DO-160	Partially concur: Section 21 of RTCA DO-160 calls for testing between 150 kHz and 30MHz. Therefore, the final policy retains this guidance. However, the last sentence calling for additional testing up to 100 MHz has been removed as requested.
42	General Dynamics	In item (k) , "Indication should be provided to enable the cabin crew to detect which outlets are in use." Currently is a requirement for new systems (AC). Comment: Has not been a requirement for existing DC systems. Request move this to section for "Additional Criteria."	Don't concur: The paragraph is applicable to DC and AC ISPSS systems. Both AC and DC systems can malfunction and emit smoke into the cabin or be a shock or fire hazard. The intent is to allow the cabin crew the ability to quickly detect which ISPSS outlets (or group of outlets) is in use should the need arise due to operational procedures (e.g., ensuring that no outlets are in use during take-off) or safety concerns (e.g., to more identify and de-power units should smoke be emitted from ISPSS equipment).
43	General Dynamics	Revise title From "Additional Criteria for the Installation of 110v, 60 Hz AC Systems" To: "Additional Criteria for the Installation of High Voltage AC Systems."	Concur: Although the commenter did not state a justification to support the request to change the title of the section devoted to AC ISPSS systems, the FAA concurs with the requests. The policy of this section applies to any high voltage AC ISPSS system, not just a 110v, 60Hz system. The section title has been revised.
44	General Dynamics	Item (l). The power outlets should be labeled with the output voltage and frequently (assume the commenter means "frequency") (110V, 60 Hz) and suitable safety instructions should be provided for the passenger detailing the PED's permitted to be used. These	Concur: Paragraph 2a has been revised as requested.

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		instructions should also include the use of the system, its limitations, hazards, and the control of airline supplied equipment." Comment: Revise the statement to include only the label with the output voltage and frequency (110V AC 60 Hz).	
45	General Dynamics	Item (m), paragraph 4, Any automatic reset feature should not be permitted. Comment: This features requires physical cycling of plug.	No specific change is requested. No change has been made from the proposed policy.
46	General Dynamics	Notes – "Note 1: It is not expected that the PED's perform to the category 'H' level of radiated emissions (ref. DO-160D Section 21). However, the power supply system should filter undesirable conducted emissions generated by the PED's or by the ISPSS itself and prevent the propagation of any unwanted RF into other aircraft systems. (see paragraph g. above)." Comment: No way to characterize. Out of ISPSS control.	Don't concur: The commenter makes no request other than to imply that the underlined text is not within the control of the ISPSS system due to unknown connected loads (e.g., laptops, hand-held electronic games, etc.). The intent of the paragraph is to ensure that the PSS for PED does not couple undesirable PED EMI emissions into other airplane systems. It is not the intent to require the PSS for PED to control PED emissions.
47	General Dynamics	On page 5 in Note 4, delete entire paragraph with the exception of the last sentence. Revise last sentence in paragraph to: "Information regarding seat mounted ISPSS equipment can be found in the AIR-100 policy memorandum *Policy and Guidance on the Approval of Electrical Components on Aircraft Seating Systems*, dated October 27, 1998, or later revisions. Comment: Note 4 states that seat-mounted electronic equipment associated with ISPSS should not be certified under the seat TSO since seat TSO's do not contain electrical	Partially concur: Although the Air-110 policy includes a TSO approval this approval is for the aspects of the IFE which may be covered by the TSO. The remaining aspects must be covered by the TC applicant. Responsibility is identified by inclusion under the seat TSO part number or if the seat is re-identified for inclusion of the IFE. Either way the end responsibility to show compliance lies with the installer. .

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		requirements. Many TSO holders disclaim the electrical function and certification of the ISPSS parts. The FAA's Aircraft Certification Service, AIR-100 previously issued a policy statement entitled *Policy and Guidance on the Approval of Electrical Components on Aircraft Seating Systems*, The 2nd paragraph of that policy statement states: "There are two basic methods of obtaining airworthiness design approval of seat mounted electronics which are strictly defined in Part 21. Either the IFE is approved under Technical Standard Order (TSO) or by the Type Certification/ Supplemental Type Certification (TC/STC) process. Both methods of approval are intended to assure that the design, certification and conformance of seat mounted electronics are adequately controlled." There currently are initiatives being worked to possibly enhance the seat TSOs in order to obtain design approval of the seat and associated electronics under the seat TSOs.	
48	General Dynamics	Notes – Note 5: Delete	Concur: The note has been removed from the final version of the policy.
49	Air Transport Association (Fernon Clark)	Page 4, Section J: Add to the end of the sentence: "or sleeving, for 115v wiring, but sleeving not required for 15 v wiring."	Partially concur: The final policy has been revised to make reference to Policy memorandum PS-ANM111-2002-01-04, System Wiring Policy for Certification of Part 25 Airplanes, which provide guidelines for proper wire installation. The specific section referred to by the commenter has been removed from the final policy.
50	Air Transport Association (Fernon Clark)	Page 4, Section K: Change: "are in use" To: "are available for use"	Partially concur: The final policy has been revised to state: "A means of indication should be provided to enable the cabin crew to detect which outlets are in use or which outlets are available for use."

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51	Raytheon Aircraft	Paragraph k: Paragraph K … states that "Indication should be provided to enable the cabin crew to detect which outlets are in use. " If there is not cabin crew, may this requirement be eliminated? Knowing which outlets are in use provides no benefit. RAC recommends that this requirement (for aircraft with and without flight attendants) be eliminated.	Concur: The policy does not include a requirement to detect which outlets were in use. It includes a means to meet a requirement. However , the ability to quickly determine if outlets are in use provides a quick way for the cabin crew to determine which outlets are in use in case of smoke or fire. If there is not a cabin crew then this feature would not provide benefit. However, if the airplane was later used in operations where a cabin crew is required then this feature would be beneficial (e.g., provisions to add this feature could be installed).
52	Raytheon Aircraft	Policy Applicability: The applicability of the policy must be clearly addressed within the title to ensure it is properly understood. The title of the policy is "In-seat power supply systems." Does this mean "wired to and as a part of the passenger seat" or accessible from the passenger seat (i.e., sidewall)? RAC does not believe that this policy should be applied to a cabin outlet that is not wire to or within the framework of a seat, as the wiring and other electrical circuitry are not subject to the additional stresses/movement of those systems that are built into the seat.	Don't concur: The final policy applies to all outlets for personal electronic devices regardless of their location. Although outlets mounted on the sidewall may not be subjected to some of the stresses that seat mounted outlets are subjected to, other safety concerns apply no matter the location of the outlet. Passenger shock hazards, hazardous interference with essential aircraft systems, and power availability are a few example. The title of the policy has been revised to reflect that it applies to power supply systems for portable electronic devices, not just seat mounted outlets. The policy summary also discusses the applicability of the policy.
53	Raytheon Aircraft	Paragraph b: This policy states that one of the operational procedures that should be included in the operations manual should include instructions on "monitoring passenger use of the system by the cabin crew." While monitoring passenger use by visual oversight of passengers in the cabin by fight attendants on a large commercial aircraft may be easily accomplished, it cannot be on small executive airplanes (no flight attendants). May this requirement be eliminated on aircraft without flight attendants?	Response: This procedure is not a necessary condition that must be complied with prior to part 25 certification. It is an operational consideration and the appropriate operating rules (e.g., parts 91, 122, 125, 129) regulate use of this type of equipments during certain flight phases.
54	Raytheon Aircraft and	NOTE: Boeing's comment is slightly different but they make the	Concur: The final policy has been amended to clarify that the outlet itself should be designed

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	The Boeing Company	same request, therefore only the Raytheon comment is reproduced here. Paragraph e: The paragraph requires a special adapter for all connected Personal Electronic Devices (PED) to operate. Adapters are easily lost, misplaced or taken by passengers (unintentionally or intentionally), rendering the ISPSS useless until replacement. This will unnecessarily increase the cost of service. Damaged adapters could also cause hazards to passengers. This will cause a burden to the operator to ensure the adapters remain in good working order. RAC recommends that adapters not be required, as it will not limit what can be plugged in. The main purpose of the ISPSS is to allow laptops and other electronic devices to be plugged, in lieu of battery operation. If the adapter accepts a standard electrical plug, no deterrent has been established, only an added cost. One note of caution with the adapters, if they are required (and RAC recommends against this) they should be subject to the same safety standards as the outlet itself (liquid protection, small object penetration, no power until engaged).	to prevent the ingress of fluid and reduce the probability of inadvertent insertion of metal objects, as well as limit the availability of output power present until the PED is correctly mated with the socket. With these types of protections in place a special adapter is not necessary.
55	General Aviation Manufacturers Association	Rulemaking by Policy The introduction states that the proposed policy describes "conditions that should be met for the approval of ISPSS" and "additional criteria to be met for the approval of the high voltage ISPSS." However, several paragraphs go beyond describing a general statement of policy or guidance for an acceptable means of compliance. Instead these paragraphs provide interpretive requirements or prescriptive criteria that shall be met by the applicant for approval of an ISPSS. It appears that some of the material is rulemaking instead of	Response: The final policy has been revised to clearly identify requirements, means of compliance to the requirements, and recommendations . As with any policy, it is not the intent of the policy to be prescriptive in the manner in which the requirements are to be met. Policy is but one acceptable means. In addition, examples may be given to further explain a compliance method. The use of illustrative examples for purposes of clarity do not establish a standard. Response to the commenter's numbered items: The commenter's numbered items focus on providing examples of perceived "rulemaking by policy" In lieu of addressing each comment

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		guidance explaining how compliance may be demonstrated with the applicable rules. For example: 1. Insofar as paragraph e. defines the characteristics of the special adapter, it appears these specifications should belong, at minimum, in a TSO, not in policy material. 2. The 100 watts limitation does not have a regulatory basis. 3. Conducted interference within the frequency range of 30-100MHz should have a regulatory basis because of the specificity. 4. Paragraph i. is so specific as to which industry standards should be used, and how they should be applied, that the matter of regulatory basis is seriously brought into question. 5. Paragraph j. specifies the use of protective means and suggests the use conduits as a means of compliance. GAMA is not sure that the suggestion is appropriate because it could cause the applicant to have to demonstrate equivalence of any other means of protection to that of "conduit".	the FAA has reorganized this policy to clearly differentiate between requirements and means of compliance. See GAMA comment and response which follows. In addition, comments which address means of compliance related to these examples are addressed elsewhere in this document.
56	General Aviation Manufacturers Association	Due to the breadth and scope of product applications embraced under FAR 25, GAMA recommends that FAA incorporate multi-tiered airworthiness approach in applicable policy and guidance material.	Response: The FAA has reformatted this policy statement to incorporate a multi-tiered approach to compliance to delineate the difference between requirements, means of compliance, and recommendations. In addition, we have incorporated this into our standard process.

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57	Weber Aircraft, LP	1. Paragraph a, subparagraph 7: Change:" In addition, appropriate quantitative and/or qualitative failure analyses of each installed ISPSS should be conducted such that any likely failure condition would not reduce aircraft safety nor endanger the occupants. The analysis should consider the effects of the environment in which any ISPSS equipment is installed, the cooling arrangements and the safety features employed to prevent a fire or overheat condition from being inadvertently created. To: In addition, appropriate quantitative failure modes and effects and/or qualitative analyses of each installed ISPSS should be conducted and utilized to eliminate such that any likely failure condition that would not reduce aircraft safety nor or endanger the occupants. The analysis should consider the effects of the environment in which any ISPSS equipment is installed, the cooling arrangements and the safety features employed to prevent a fire or overheat condition from being inadvertently created. A minimally acceptable reliability and safety engineering design effort for commercial transport equipment should automatically require the use of a failure modes and effects analysis (FMEA). Therefore, this type of analysis should be readily available for review and consideration. In addition, the nature and thoroughness of an FMEA is usually indicative of the equipment reliability and safety design integrity. It should also be note that use of the word "qualitative" to define this statement of policy requirement may result in inferior equipment being installed in aircraft.	Don't concur: FMEA is not a requirement but it can be used to satisfy § 25.1309 The purpose of the this portion of the policy is to highlight those items that should be considered to meet the requirements of § 25.1309. There are various methods available to conduct the appropriate failure analysis, the FMEA is one of those methods.

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58	Weber Aircraft, LP	Revise Paragraph h., subparagraph 1 from: An electromagnetic compatibility (EMC) evaluation of the ISPSS should be accomplished for all foreseeable EMC worst case conditions. To: An electromagnetic compatibility (EMC) evaluation of the ISPSS should be accomplished for all foreseeable operating and standby conditions.	Concur: The policy has been revised as requested
59	Weber Aircraft, LP	Revise Paragraph h., subparagraph 3 to read: In the absence of a more rational analysis, the following cases should be considered: No load One load: minimum, maximum PED power; Several loads connected; All loads connected: minimum, maximum PED Power The absence of a load does not necessarily create a benign EMC condition and a thorough analytical procedure requires a "zero point" baseline, if possible. The use of the description "minimum, maximum power" as a requirement is somewhat confusing. Does it refer to the PED load?	Concur: The policy has been revised as requested. The minimum/maximum power is referring to the minimum and maximum power that is delivered by the PSS for PED.
60	Weber Aircraft, LP	Revise Paragraph h., subparagraph 4 to read: "This should be followed by . . . the conducted interference from the PED's (30 – 6,000 MHz). Known worst case . . . Comment: Current microprocessor primary clock frequencies can be as high as 900 MHz and are likely to reach	Partially Concur: Although it is important to consider EMC during component design, this policy lays out an acceptable means for applicants to meet which is consistent with todays standards and can be applied consistently. The FAA feels that testing the systems per current industry accepted guidelines (i.e., RTCA Do-160D) will provide adequate assurance that essential and critical airplane systems are not adversely susceptible to interference generated by the PSS for PED systems. If some applicants wish to establish

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		gigahertz frequencies well with the useable life of the aircraft equipment addressed herein. The importance of EMC design and testing for this equipment is very significant and careful consideration should be given when establishing EMC requirements.	means different than those in policy they may do so. (See also the response to Comment No. 34)
61	Weber Aircraft, LP	Revise Paragraph j, subparagraph 1 from: j. To guard against damage to ISPSS cable assemblies installed in the seat itself, seat mounted wiring should have appropriate protection means, such as protective conduits. TO: To guard against damage to ISPSS cable assemblies installed in the seat itself, seat mounted wiring should have appropriate protection means, as specified elsewhere. Comment: There are a number of current industry standards and documents that define "appropriate protection means" requirements and encompass more than just the use of protective coverings.	Don't concur: See response to Comment No. 40.
62	Weber Aircraft, LP	Revise Paragraph m., subparagraph 1 From: Suitable means of protection, such as differential protection and/or galvanic isolation (isolation transformer), should be provided to minimize the risk of passenger shock. This is to guard against inadvertent contact with live parts of the system. To: : Suitable means of protection, such as differential protection should be provided to minimize the risk of passenger shock and the use of an isolation transformer as the only means of passenger shock protection is not permitted. This is to guard against inadvertent contact with live	Don't concur: The intent of the paragraph is to say that the possibility of passenger shock must be considered and that suitable means to address the possibility should be considered in the systems design. It is the applicant responsibility to propose the means of protection to the FAA and demonstrate that it performs its intended function. If an isolation transformer would not be sufficient for a particular design the applicant would be required to propose a different or additional means for providing the shock protections.

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		parts of the system. Comment: The use of an isolation transformer does not necessarily prevent a shock hazard and any 400 Hz to 60 Hz conversion system would probably use a transformer that could be interpreted as an "isolation transformer."	
63	Weber Aircraft, LP	Paragraph m. subparagraph 3: Comment: It is hereby recommended that a more specific definition of "fault current" or "differential protection" be included in this statement of policy.	Concur: The policy has been revised as requested.
64	Weber Aircraft, LP	Note 1: From: Note 1: It is not expected . .. (see paragraph g above). To: Note 1: It is not expected . .. (see paragraph g, h, and i above). Comment: Paragraphs h and i also define or expand EMC requirements.	Partially concur: The paragraphs of the final policy have been rearranged and Note 1 has been revised to reference the appropriate paragraph.
65	Weber Aircraft, LP	Revise the policy Applicability Statement: From: The general policy stated in this document is not intended to establish a binding norm; . . . Also, as with all advisory material . . . To: The general policy stated in this document is not intended to establish a binding norm; . . . In the event that any or all of the requirements specified in this statement of policy become regulation, the FAA reserves the right to require replacement of any regulation non-compliant systems installed after the effective date of this statement of policy with compliant systems, unless a previous deviation has been granted by the	Don't concur: The general policy stated in the final policy does not constitute a new regulation, but rather one means that an applicant can follow to demonstrate compliance to the applicable 14 CFR part 25 regulations. Should a previously certified PSS for PED system be identified as having unsafe design conditions the FAA will initiate mandatory corrective action using the Airworthiness Directive process (reference 14 CFR parts 21 and 39)

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		FAA Also, as with all advisory material . . . Comment: Considering the critical safety issues applicable to an aircraft ISPSS, it is hereby respectfully suggested that the FAA reserve the right to eliminate any hazardous systems that may be installed in-service as a result of not being in strict compliance to the requirements as specified in this proposed advisory, whether started or intended.	
66	Weber Aircraft, LP	General Comment: If changes similar to those recommended herein are incorporated into the statement of policy, a slight reorganization of requirements is recommended in order to simplify the requirement statements, especially with respect to the requirements for the on/off switch(s) and status indicator(s). Consideration should, also, be given to the possibility of providing separate switches for each class cabin.	Response: The final policy has been reorganized in a manner to facilitate easy identification of the various acceptable compliance methods for the electrical certification of a PSS for PED.