Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Seat Testing Harmonization Working Group

Task 2 – Passenger Seat Safety

Task Assignment

DEPARTMENT OF TRANSPORTATION

Coast Guard

[USCG–1998–4353]

Towing Safety Advisory Committee

AGENCY: Coast Guard, DOT.

ACTION: Notice of meetings.

SUMMARY: The Towing Safety Advisory Committee (TSAC) and its working groups will meet to discuss various issues relating to shallow-draft inland and coastal waterway navigation and towing safety. All meetings are open to the public.

DATES: TSAC will meet on Wednesday, September 23, 1998, from 9 a.m. to 1 p.m. TSAC working groups will meet on Tuesday, September 22, 1998, from 9 a.m. to 3:30 p.m. These meetings may close early if all business is finished. Written material and requests to make oral presentations should reach the Coast Guard on or before September 14, 1998. Requests to have a copy of your material distributed to each member of the committee or working group should reach the Coast Guard on or before September 8, 1998.

ADDRESSES: TSAC will meet in the North Auditorium, Jackson Federal Building, 915 2nd Avenue, Seattle, Washington. The working groups will meet in the same room. Send written material and requests to make oral presentations to Lieutenant Lionel Mew, Commandant (G–MSO–1), U.S. Coast Guard Headquarters, 2100 Second Street SW., Washington, DC 20593–0001. This notice is available on the Internet at http://dms.dot.gov.

FOR FURTHER INFORMATION CONTACT: For questions on this notice, contact Lieutenant Lionel Mew, Assistant Executive Director of CTAC, telephone 202–267–0218, fax 202–267–4570. For questions on viewing, or submitting material to, the docket, contact Dorothy Walker, Chief, Dockets, Department of Transportation, 202–366–9329.

SUPPLEMENTARY INFORMATION: Notice of these meetings is given under the Federal Advisory Committee Act, 5 U.S.C. App. 2.

Agendas of Meetings

Towing Safety Advisory Committee (TSAC) and working group meetings. The agendas tentatively include the following:

(1) Report of the Coast Guard Research and Development Center study on inland towing vessel crew fatigue.

(2) Progress report from the Voyage Planning working group.

(3) Discussion on Alternative Convention Tonnage issues.

(4) Recommendations on the G–M Performance Plan.

(5) Discussion of the Merchant Marine Licensing and Documentation Reengineering Plan.

(6) Status update on the National Marine Safety Incident Reporting System.

(7) Progress report from the Electronic Charting Standards working group.

(8) Presentation by working groups of their accomplishments and future plans.

Procedural

Both meetings are open to the public. Please note that the meetings may close early if all business is finished. At the Chairs' discretion, members of the public may make oral presentations during the meetings. If you would like to make an oral presentation at a meeting, please notify the Assistant Executive Director no later than September 14, 1998. Written material for distribution at a meeting should reach the Coast Guard no later than September 14, 1998. If you would like a copy of your material distributed to each member of the committee or subcommittee in advance of a meeting, please submit 25 copies to the Assistant Executive Director no later than September 8, 1998.

Information on Services for Individuals With Disabilities

For information on facilities or services for individuals with disabilities or to request special assistance at the meetings, contact the Assistant Executive Director as soon as possible.

Dated: August 24, 1998.

Joseph J. Angelo,

Director of Standards, Marine Safety and Environmental Protection.

[FR Doc. 98–23371 Filed 8–28–98; 8:45 am]

BILLING CODE 4910–15–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; Transport Airplanes and Engine Issues—New Task

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of new task assignment for the Aviation Rulemaking Advisory Committee (ARAC).

SUMMARY: Notice is given of a new task assigned to and accepted by the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of ARAC.

FOR FURTHER INFORMATION CONTACT: Stewart R. Miller, Transport Standards Staff (ANM–110), Federal Aviation Administration, 1601 Lind Avenue, SW., Renton, WA 98055–4056; phone (425) 227–1255; fax (425) 227–1320.

SUPPLEMENTARY INFORMATION:

Background

The FAA has established an Aviation Rulemaking Advisory Committee to provide advice and recommendations to the FAA Administrator, through the Associate Administrator for Regulation and Certification, on the full range of the FAA's rulemaking activities with respect to aviation-related issues. This includes obtaining advice and recommendations on the FAA's commitment to harmonize its Federal Aviation Regulations (FAR) and practices with its trading partners in Europe and Canada.

One area ARAC deals with is Transport Airplane and Engine Issues. These issues involve the airworthiness standards for transport category airplanes and engines in 14 CFR parts 25, 33, and 35 and parallel provisions in 14 CFR parts 121 and 135.

The Task

This notice is to inform the public that the FAA has asked ARAC to provide advice and recommendation on the following harmonization task:

Task 2: Passenger Seat Safety

The primary issue for FAR 25.562:

FAR 25.562(b) states ''Each seat type design approved for crew or passenger occupancy during takeoff and landing must successfully complete dynamic test or be demonstrated by rational analysis based on dynamic tests of a similar type seat * * *.'' The method for determining the required ''rational analysis based on dynamic tests'' is different between regulatory bodies.

The FAA has accepted the Revised Means of Compliance (RMCC) as a method of determining which members of a seat family must be demonstrated by dynamic test so that the rest may be certified by similarity. The JAA has not accepted this method of determining the test seats. Harmonization of test article selection is the objective.

A secondary issue for FAR 25.562:

Harmonization should also occur on other methods of compliance to FAR 25.562, including pass/fail criteria and test methodology.

The primary issue for FAR 25.785:

FAR 25.785(c) states that each seat or berth must be approved. The FAA requires all seats that are ''in-flight only'' to have a restraint system before they will be approved. The JAA does not require restraints for seats that are not occupied for taxi, takeoff and

landing. Harmonization on this issue is the goal.

A secondary issue for FAR 25.785:

FAR 25.785(b) states ''Each seat and berth * * * must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertial forces specified in 25.561 and 25.562.'' FAR 25.785(e) states ''Berths must be free from corners and protuberances likely to cause injury to a person occupying the berth during emergency conditions.'' The subjective criteria used to determine ''corners and protuberances likely to cause injury'' and the test/analysis required to demonstrate compliance are different between regulatory bodies. The expectations for demonstrating compliance should be harmonized.

Three specific areas of passenger seat certification issues need to be addressed:

(a) In-Flight Entertainment (IFE) video arms which allow a video screen to rotate in front of the passenger during flight.

(b) Seat back mounted accessories such as telephones, video screens, etc.

(c) Definition of what design features are considered sharp edges or in appropriate corners when exposed to the passenger cabin.

Guidance on acceptable methods of compliance should be provided which are acceptable to both the FAA and the JAA. An advisory circular should be revised or newly issued to address the new guidance.

The FAA expects ARAC to submit its recommendation(s) by July 31, 2000.

The FAA requests that ARAC draft appropriate regulatory documents with supporting economic and other required analyses, and any other related guidance material or collateral documents to support its recommendations. If the resulting recommendation(s) are one or more notices of proposed rulemaking (NPRM) published by the FAA, the FAA may ask ARAC to recommend disposition of any substantive comments the FAA receives.

Working Group Activity

ARAC has accepted the task and has chosen to assign it to the existing Seat Testing Harmonization Working Group. As a result of the new task assigned to the working group and because the working group has been dormant for some time, membership is being reopened. The working group will serve as staff to ARAC to assist ARAC in the analysis of the assigned task. Working group recommendations must be reviewed and approved by ARAC. If ARAC accepts the working group's recommendations, it forwards them to the FAA as ARAC recommendations.

The Seat Testing Harmonization Working Group is expected to comply with the procedures adopted by ARAC. As part of the procedures, the working group is expected to:

1. Recommend a work plan for completion of the tasks, including the rationale supporting such a plan, for consideration at the meeting of ARAC to consider transport airplane and engine issues held following publication of this notice.

2. Give a detailed conceptual presentation of the proposed recommendations, prior to proceeding with the work stated in item 3 below.

3. Draft appropriate regulatory documents with supporting economic and other required analyses, and/or any other related guidance material or collateral documents the working group determines to be appropriate; or, if new or revised requirements or compliance methods are not recommended, a draft report stating the rationale for not making such recommendations. If the resulting recommendation is one or more notices of proposed rulemaking (NPRM) published by the FAA, the FAA may ask ARAC to recommend disposition of any substantive comments the FAA receives.

4. Provide a status report at each meeting of ARAC held to consider transport airplane and engine issues.

Participation in the Working Group

The Seat Testing Harmonization Working Group will be composed of technical experts having an interest in the assigned task. A working group member need not be a representative of a member of the full committee.

An individual who has expertise in the subject matter and wishes to become a member of the working group should write to the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the tasks, and stating the expertise he or she would bring to the working group. All requests to participate must be received no later than October 1, 1998. The requests will be reviewed by the assistant chair, the assistant executive director, and the working group chair, and the individuals will be advised whether or not the request can be accommodated.

Individuals chosen for membership on the working group will be expected to represent their aviation community segment and participate actively in the working group (e.g., attend all meetings, provide written comments when requested to do so, etc.). They also will be expected to devote the resources necessary to ensure the ability of the working group to meet any assigned deadline(s). Members are expected to keep their management chain advised of working group activities and decisions to ensure that the agreed technical solutions do not conflict with their sponsoring organization's position when the subject being negotiated is presented to ARAC for a vote.

Once the working group has begun deliberations, members will not be added or substituted without the approval of the assistant chair, the assistant executive director, and the working group chair.

The Secretary of Transportation has determined that the formation and use of ARAC are necessary and in the public interest in connection with the performance of duties imposed on the FAA by law.

Meetings of ARAC will be open to the public. Meetings of the Seat Testing Harmonization Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on August 25, 1998.

Joseph A. Hawkins,

Executive Director, Aviation Rulemaking Advisory Committee.

[FR Doc. 98–23365 Filed 8–28–98; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Environmental Impact Statement; Stillwater County, Montana

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Revised notice of intent.

SUMMARY: The FHWA is issuing this notice to advise the public of a revision to the southern limit for the proposed improvements to Montana Primary 78 (P–78) in Stillwater County, Montana. The southern terminus of the project has been changed from the junction of P–78 with Butcher Creek Road, to the P–78 junction with FAS 419, shortening the project by approximately 5 kilometers (3 miles). This revision represents a logical termini to the proposed improvements as the roadway volumes of P–78 decrease at its junction with FAS 419. An Environmental Impact Statement will be prepared for the proposed highway project in Stillwater County, Montana.

Recommendation Letter

400 Main Street
East Hartford, Connecticut 06108

Pratt & Whitney
A United Technologies Company

April 18, 2000

Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Attention: Mr. Thomas McSweeny, Associate Administrator for Regulation and Certification

Subject: ARAC Recommendations

Reference: ARAC Tasking, Federal Register, November 19, 1999

Dear Tom,

The Transport Airplane and Engine Issues Group is pleased to submit the following "Fast Track" reports as recommendations to the FAA in accordance with the reference tasking. These reports have been prepared by the ~~Seat~~ Test Harmonization Working Group.

Task 1

- FAR 25.562 - 16G Seat Method of Compliance – ANM-93-732-A

2

- FAR 25.785(c) - Seat Belts for Inflight Use Only
- FAR 25.785(e) + (b) - Occupant Protection – ANM-98-439-A

Please note that the Fast Track report for FAR 25.562 – 16G Seat Method of Compliance, has comments from the Association of Flight Attendants (AFA) attached. These comments were provided to the Working Group after the report had been accepted and unanimously agreed to by the Working Group membership. As such, the AFA comments have not been reviewed and discussed by the Working Group. At the request of AFA, TAEIG agreed to attach the comments to the report submittal and the Seat Test Working Group has agreed to review the comments when the package is returned to the Working Group for final review at Phase 4 of the Fast Track process.

Sincerely yours,

Craig R. Bolt

Craig R. Bolt
Assistant Chair, TAEIG

Attachments

Copy: Kris Carpenter, FAA-NWR
*Nick Calderone, Boeing
*Effie Upshaw, FAA Washington, DC

*letter only

crb02_040400

Acknowledgement Letter

MAY 16 2000

Mr. Craig Bolt
Assistant Chair, Transport Airplanes
and Engines Issues Group
400 Main Street
East Hartford, CT 06108

Dear Mr. Bolt:

This letter acknowledges receipt of your April 18 letter transmitting technical reports that you submitted on behalf of the Aviation Rulemaking Advisory Committee (ARAC) on Transport Airplane and Engine Issues (TAE):

Task No.	Description of Recommendation	Working Group
1	Fast track reports addressing § 25.562 (Emergency landing dynamic conditions (16-g seat method of compliance)) and	Seat Test Harmonization Working Group
2	§§ 25.785 (Seats, berths, safety belts, and harnesses) paragraphs (c) (seat belts for inflight use only) and (b) + (e) (occupant protection)	

The above listed reports will be forwarded to the Transport Airplane Directorate for review. The Federal Aviation Administration's progress will be reported at the TAE meetings.

I would like to thank the ARAC, particularly those members associated with TAE for its cooperation in using the fast track process and completing the working group reports in a timely manner.

Sincerely,

ORGINIAL SIGNED BY
ANTHONY F. FAZIO

Tony F. Fazio
Director, Office of Rulemaking

ARM-209:EUpshaw:fs:4/27/00:PCDOCS #11936 v1
cc: ARM-1/20/200/209; APO-300/320, ANM-114

Control Nos. 200016101-0

File #ANM-93-732-A and ANM-98-439-A

CONCURRENCES	
ROUTING SYMBOL	ARM-209
INITIALS/SIGNATURE	eu
DATE	4/28/00
ROUTING SYMBOL	ANM-114
INITIALS/SIGNATURE	See attached grid
DATE	5/3/00
ROUTING SYMBOL	ARM-25
INITIALS/SIGNATURE	RJ
DATE	5/11
ROUTING SYMBOL	APO-320
INITIALS/SIGNATURE	See attached grid
DATE	5/03/00
ROUTING SYMBOL	ARM-200
INITIALS/SIGNATURE	Courtney
DATE	5/11/00
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
ROUTING SYMBOL	ARM-1
INITIALS/SIGNATURE	
DATE	

Recommendation

SHWG Report for Task 2 - Seat Belts for In-Flight Only Seats - 25.785

1 - What is underlying safety issue to be addressed by the FAR/JAR?

FAR 25.785(c) states that each seat and berth must be approved. The FAA requires all seats that are "in-flight only" to have a restraint system before they will be approved. The JAA does not require restraints for all seats that are not occupied for taxi, takeoff and landing. Harmonization on this issue is the goal.

2 - What are the current FAR and JAR standards relative to this subject?

The applicable regulations are:

Current FAR text: **Sec. 25.785 Seats, berths, safety belts, and harnesses.**

(c) Each seat or berth must be approved.

(f) Each seat or berth, and its supporting structure, and each safety belt or harness and its anchorage must be designed for an occupant weight of 170 pounds, considering the maximum load factors, inertia forces, and reactions among the occupant, seat, safety belt, and harness for each relevant flight and ground load condition (including the emergency landing conditions prescribed in Sec. 25.561). In addition--
(1) The structural analysis and testing of the seats, berths, and their supporting structures may be determined by assuming that the critical load in the forward, sideward, downward, upward, and rearward directions (as determined from the prescribed flight, ground, and emergency landing conditions) acts separately or using selected combinations of loads if the required strength in each specified direction is substantiated. The forward load factor need not be applied to safety belts for berths.
(2) Each pilot seat must be designed for the reactions resulting from the application of the pilot forces prescribed in Sec. 25.395.
(3) The inertia forces specified in Sec. 25.561 must be multiplied by a factor of 1.33 (instead of the fitting factor prescribed in Sec. 25.625) in determining the strength of the attachment of each seat to the structure and each belt or harness to the seat or structure.

[Doc. No. 24344, Amdt. 25-72, 55 FR 29780, July 20, 1990; as amended at Amdt. 25-88, 61 FR 57956, Nov. 8, 1996]

Current JAR text: **JAR 25.785 Seats, berths, safety belts and harnesses.**

Date: May 27, 1994

(c) Each seat or berth must be approved.

(f) Each seat or berth, and its supporting structure, and each safety belt or harness and its anchorage must be designed for an occupant weight of 170 pounds, considering the maximum load factors, inertia forces, and reactions among the occupant, seat, safety belt, and harness for each relevant flight and ground load condition (including the emergency landing conditions prescribed in JAR 25.561). In addition--
(1) The structural analysis and testing of the seats, berths, and their supporting structures may be determined by assuming that the critical load in the forward, sideward, downward, upward, and rearward directions (as determined from the prescribed flight, ground, and emergency landing conditions) acts separately or using

selected combinations of loads if the required strength in each specified direction is substantiated. The forward load factor need not be applied to safety belts for berths.
(2) Each pilot seat must be designed for the reactions resulting from the application of the pilot forces prescribed in JAR 25.395.
(3) For the determination of the strength of the local attachments (see ACJ 25.561(c)) of--
(i) Each seat to the structure; and
(ii) Each belt or harness to the seat or structure;
a multiplication factor of 1.33 instead of the fitting factor as defined in JAR 25.625 should be used for the inertia forces specified in JAR 25.561. (For the lateral forces according to JAR 25.561(b)(3) 1.33 times 3.0g should be used.)

2a – If no FAR or JAR standard exists, what means have been used to ensure this safety issue is addressed?

FAR and JAR Exist

3 - What are the differences in the FAA and JAA standards or policy and what do these differences result in? :

The difference in FAA and JAA standards resulted in certified seat installations that had seat belts in some cases, and did not have seat belts in other cases depending on the certifying regulatory agency.

4 - What, if any, are the differences in the current means of compliance?

See above.

5 – What is the proposed action?

No change to the regulation is required. JAA guidance material must be updated to reflect the FAA interpretation.

For each proposed change from the existing standard, answer the following questions:

6 - What should the harmonized standard be?

See ARAC-SHWG Task 2 Concept Paper (attached).

7 - How does this proposed standard address the underlying safety issue (identified under #1)?

This provides an improved level of safety for aircraft due to the addition of the restraint system on "in-flight only" seats.

8 - Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain.

No change to the FAR.

9 - Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain.

This provides an improved level of safety for aircraft due to the addition of the restraint system on " in-flight only" seats.

10 - What other options have been considered and why were they not selected? :
Both the FAA position, requiring seat belts on " in-flight only" and the JAA position not requiring restraints on these seats were considered.

11 - Who would be affected by the proposed change?
Seat suppliers and airframe manufacturers who traditionally certify through the JAA.

12 - To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?
No applicable guidance material exists.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?
AC 25-17 should incorporate the contents of the concept paper.

14 - How does the proposed standard compare to the current ICAO standard?
Unknown

15 - Does the proposed standard affect other HWG's?
No impact

16 - What is the cost impact of complying with the proposed standard?
Cost of compliance, if any, would be small. Very few seat suppliers and airframe manufacturers have configurations that fall under this guidance. Since no retroactive application of this guidance has been considered, the existing airline fleet would not be impacted.

17. - If advisory or interpretive material is to be submitted, document the advisory or interpretive guidelines. If disagreement exists, document the disagreement.
All data for this task is contained in the attached concept paper.

18. - Does the HWG wish to answer any supplementary questions specific to this project?
No supplementary questions have been identified at this time.

19. – Does the HWG want to review the draft NPRM at "Phase 4" prior to publication in the Federal Register?
Yes. The ARAC-SHWG wishes to review the draft guidance material before it is adopted by the regulatory agencies.

SHWG Report for Task 2 - Seat Belts for In-Flight Only Seats - 25.785

20. – In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process? Explain.

The Fast Track process is appropriate for this task.

ARAC Seat Harmonization Working Group

Concept Paper – Task 2 – Seat Belts for In-Flight Only Seats

Background

Recent cabin interior designs, especially for large transport aircraft, have introduced various types of seating for use by both passengers and crew during flight only as part of the aircraft type design. These are typically used occasionally during flight with the occupants returning to their designated seats for take-off and landing phase. The purpose of this advisory material is to clarify the need for restraints, in the form of seat belts, to be fitted to seats in this category.

However, it is recognized that unique features in cabin design present cabin items that could conceivably be used as 'occasional seats. Wherever practical, these items are to be placarded "No seat". Additionally, common sense must prevail and not require restraints to be fitted, For example, seat belts are not required for lavatory seats, escape slide bustles, floor mounted stowages, etc.

Issues relating to oxygen drops, lighted signs, etc. have been raised and are outside the scope of this working group. If these issues need to be addressed, a different team with the appropriate skills and knowledge should address them.

Seat Belts for In-Flight Only Seats

Restraints must be available for the seated occupant for in-flight only seats. For objects that are designed as seats, a lap restraint shall be provided. The seat and restraint system must be substantiated for in-flight loads and flammability requirements. The restraint installation shall be evaluated to ensure it does not pose a trip hazard during egress.

In order to be effective, it is understood that the seat (with restraint) must have back support.

Implementation of this guidance is intended for new certification programs. No retrofit of previously certified seat part numbers and installations is required.

Special seats designed for small airframe or corporate aircraft (under Part 25) may not practically accommodate seat belts. These designs should be reviewed on a case-by-case basis with the regulatory agency to understand if this criterion applies.

Quality and workmanship of the restraint system shall be consistent with TSO/JTSO C22 or TSO/JTSO C114 or equivalent.

SHWG Report for Task 3 – Occupant Protection (Sharp Edges) – 25.785

1 - What is underlying safety issue to be addressed by the FAR/JAR?

The intent of this rule is to provide an appropriate means of occupant protection from corners and protrusions likely to cause injury during emergency conditions. The three specific areas of passenger seat certification issues to be harmonized:

a) Definition of design features considered sharp edges or inappropriate corners when exposed to seat occupants

b) In-Flight entertainment video arms

c) Seat back mounted accessories

2 - What are the current FAR and JAR standards relative to this subject?

The applicable regulations are:

Current FAR text: **Sec. 25.785 Seats, berths, safety belts, and harnesses.**

(b) Each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertia forces specified in Secs. 25.561 and 25.562.

(e) Each berth must be designed so that the forward part has a padded end board, canvas diaphragm, or equivalent means, that can withstand the static load reaction of the occupant when subjected to the forward inertia force specified in Sec. 25.561. Berths must be free from corners and protuberances likely to cause injury to a person occupying the berth during emergency conditions.

[Doc. No. 24344, Amdt. 25-72, 55 FR 29780, July 20, 1990; as amended at Amdt. 25-88, 61 FR 57956, Nov. 8, 1996]

Current JAR text: **JAR 25.785 Seats, berths, safety belts and harnesses.**

Date: May 27, 1994

(b) Each seat, berth, safety belt, harness, and adjacent part of the aeroplane at each station designated as occupiable during take-off and landing must be designed so that a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertia force specified in JAR 25.561 and JAR 25.562.

(e) Each berth must be designed so that the forward part has a padded end board, canvas diaphragm, or equivalent means, that can withstand the static load reaction of the occupant when subjected to the forward inertia force specified in JAR 25.561. Berths must be free from corners and protuberances likely to cause injury to a person occupying the berth during emergency conditions.

2a – If no FAR or JAR standard exists, what means have been used to ensure this safety issue is addressed?

FAR/JAR exist along with regulatory guidance material.

3 - What are the differences in the FAA and JAA standards or policy and what do these differences result in?:

The FAR and JAR regulations are the same. Differences exist in the means of compliance to the regulations.

4 - What, if any, are the differences in the current means of compliance?

Differences in the current method(s) of compliance are generally:

a) *No industry standards exist for determination of injurious edges, corners and protrusions. Different judgement was applied with different regulatory agencies.*

b) *No standard method of certifying in-arm video monitors existed. The FAA applied one standard of test/analysis and the JAA applied a different standard for test/analysis.*

c) *No standard method of certifying seat back mounted accessories existed. The FAA applied one standard of test/analysis and the JAA applied a different standard for test/analysis.*

5 – What is the proposed action?

Develop harmonized means of compliance based on accepted industry design data and certification practices. All industry and regulatory agencies agree to implement the new methods of compliance.

For each proposed change from the existing standard, answer the following questions:

6 - What should the harmonized standard be?

See attached concept paper for Task 3.

7 - How does this proposed standard address the underlying safety issue (identified under #1)?

Use of the principles in the concept paper result in an equivalent level of safety that is mutually acceptable by the FAA and JAA.

8 - Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain

The concept paper maintains the current level of safety. The regulation remains the same. The means of showing compliance has been standardized and clarified for all industry participants.

9 - Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain.

The concept paper maintains the current level of safety. The means of showing compliance has been standardized and clarified for all industry participants.

10 - What other options have been considered and why were they not selected?:

Standards from other industries (automobiles, child play equipment, SAE design standards, etc.) were surveyed. Current company-proprietary methods of

compliance were researched. Elements of these standards have been incorporated into the ARAC-SHWG concept paper as they applied to aircraft seating.

11 - Who would be affected by the proposed change?

The seat suppliers, airframe manufacturers, regulatory authorities and airlines would have the choice of using the new ARAC-SHWG Task 3 concept paper approach or using previously agreed upon practices with the applicable regulatory agency.

12 - To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?

AC 25-17 – Crashworthiness Handbook

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

The content of ARAC-SHWG Task 3 Concept Paper should be adopted as FAA guidance material.

14 - How does the proposed standard compare to the current ICAO standard?

Unknown at this time

15 - Does the proposed standard affect other HWG's?

No

16 - What is the cost impact of complying with the proposed standard?

The cost impact expectations are as follows:

a) There is no anticipated cost impact for the sharp edges/corners/protrusions standards.

b) There is a nominal cost impact for implementing standardized in-arm video testing/analysis. The reduced cost of testing for current FAA certification programs is expected to be offset by the increased testing for JAA programs. Testing costs should decline as in-arm video system design matures.

c) Same as (b) above for seat back mounted accessories.

17. - If advisory or interpretive material is to be submitted, document the advisory or interpretive guidelines. If disagreement exists, document the disagreement.

All data for this task is contained in the attached concept paper.

18. - Does the HWG wish to answer any supplementary questions specific to this project?

No supplementary questions have been identified at this time.

19. – Does the HWG want to review the draft NPRM at "Phase 4" prior to publication in the Federal Register?

Yes. The ARAC-SHWG wishes to review the draft guidance material before it is adopted by the regulatory agencies.

20. – In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process? Explain.

The Fast Track process is appropriate for this task.

1.0 Introduction

This concept paper outlines the harmonized guidance on occupant protection for FAR/JAR 25.785 for passenger seats. This guidance is divided in three sections; general design practices, in-arm video certification and seat back mounted accessory certification. This concept paper separately considers aircraft that have Amendment 25-64 as part of the certification basis as well as Pre-amendment 25-64 aircraft.

For these sections, two types of injury mechanisms are considered in the compliance criteria. The first is blunt trauma injury. This is a deceleration injury based on head impact. Typical criteria used in assessing this type of injury are Head Injury Criteria (HIC), average G and kinetic energy. For aircraft with 25.562(c)(5) as part of the certification basis, HIC must be used. For other aircraft, several methods of assessing blunt impact trauma are acceptable.

The other injury mechanism is due to impact with sharp edges. This is further divided into general design criteria for parts of the seat that are exposed to the passengers under normal use, and the assessment of potential sharp edges after an impact or abuse load scenario on the seat.

2.0 Related Regulations (14 CFR & JAR 25 Change 14)

25.562 – This requires that the seat and restraint system be designed such that each occupant is protected during emergency landing conditions. Specific criteria are included to facilitate finding compliance with this regulation.

25.601 – The airplane shall not have design features or details that experience has shown to be hazardous or unreliable. The suitability of each questionable design detail and part must be established by tests.

25.785 (b) – This requires each seat, berth, safety belt, harness and adjacent part of the airplane at each station designated as occupiable during take-off and landing must be designed so a person making proper use of these facilities will not suffer serious injury in an emergency landing as a result of the inertial forces specified in 25.561 and 25.562.

25.785(k) – This requires each projecting object that would injure persons seated or moving about the airplane in normal flight must be padded.

Although 25.785(b) and (k) require consideration of more than seats and berths when establishing compliance, the guidance in this concept paper has been specifically developed for seating systems. Furthermore, these requirements address two scenarios, those associated with an emergency landing and those associated with normal flight. From the regulation wording, it is evident that the extent of the acceptable injuries differs between the two scenarios. For emergency landing, serious injuries must be prevented, whereas in normal flight, any projecting object that could cause injuries must be padded. For example, minor cuts and abrasions could be accepted as not causing serious injury in the case of emergency landing condition, but would not be acceptable in the normal flight condition scenario.

3.0 Definitions

Exposed: An exposed component of a seating system is a component that a person may contact under normal function/operation of the seating system as installed in the aircraft. This would exclude components that are discretely located (not normally contacted) or only accessed during maintenance, repair or assembly of the seating system.

Head Contactable surface: Any surface within the specified zone (head strike zone) that can be contacted by 165-mm diameter head form. The head size is taken from the ATD specified in FAR/JAR 25.562

Head Strike Zone:

a) Aircraft without 25.562(c)(5) in the certification basis – The area defined as a 35 inch arc from the seat CRP bounded by the inside of the arm rests. The seat pitch is representative of the aircraft installation. This is established independent of seat orientation or installation angle (up to 18 degrees). Seats at angles 18 degrees and greater are considered side facing seats and beyond the scope of this document.

   When determining the head strike zone on the seat back ahead of the occupant, some nominal forward rotation of the seat back can be considered. The amount of seat back rotation is dependent upon the particular seat design and should be proposed as part of the head strike analysis. The forward rotation allowed in the analysis is to account for the "free play" or break-over provisions in the seat back. It is not intended to account for forward deformation of the seat back during a crash event.

b) Aircraft with 25.562(c)(5) in the certification basis – The head path collected by 16g forward tests for 25.562.

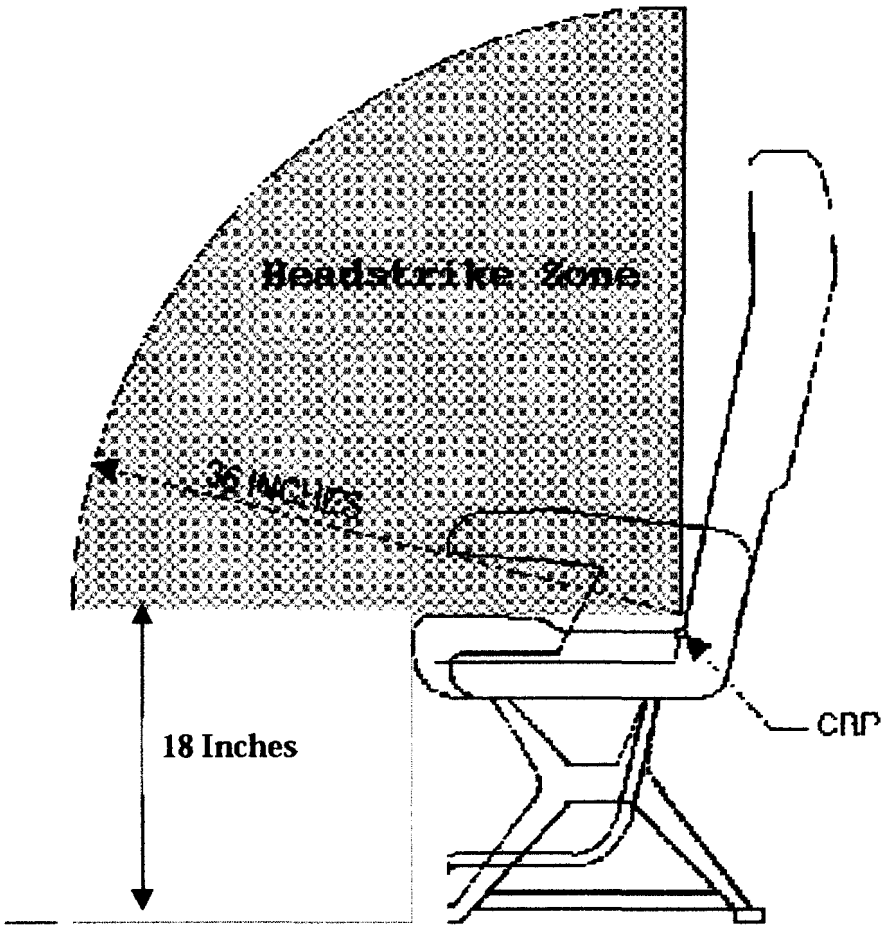


Figure 1a – Pre-amendment 25-64 Head Strike Zone

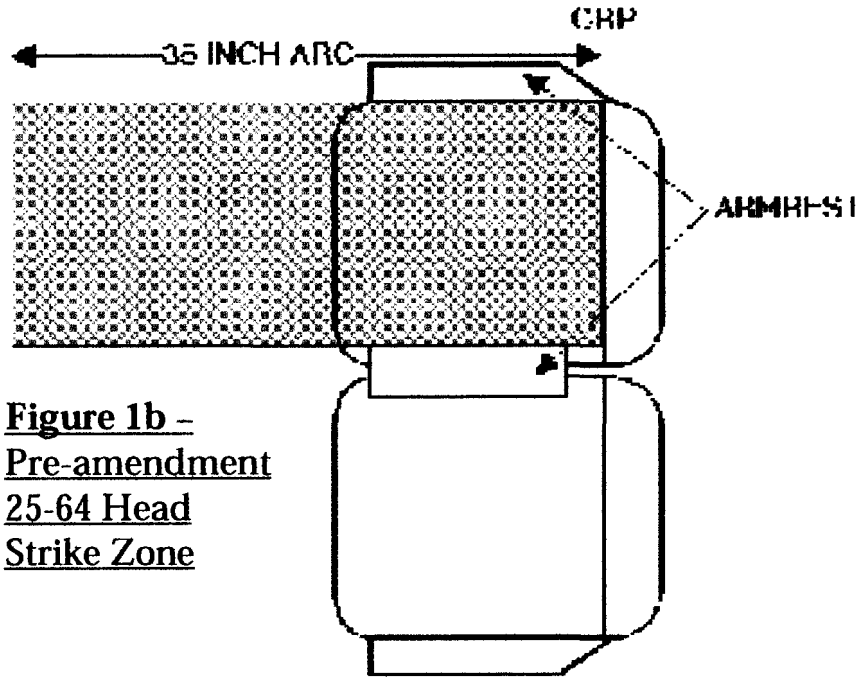
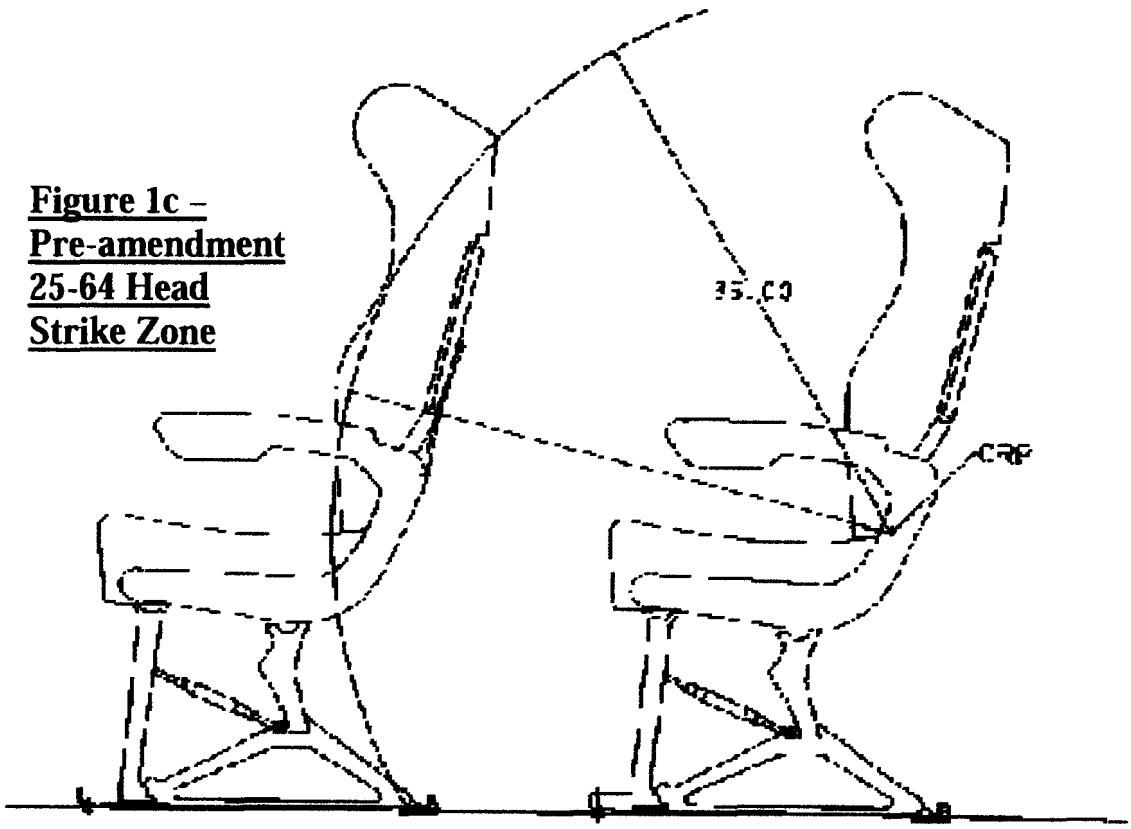


Figure 1b – Pre-amendment 25-64 Head Strike Zone

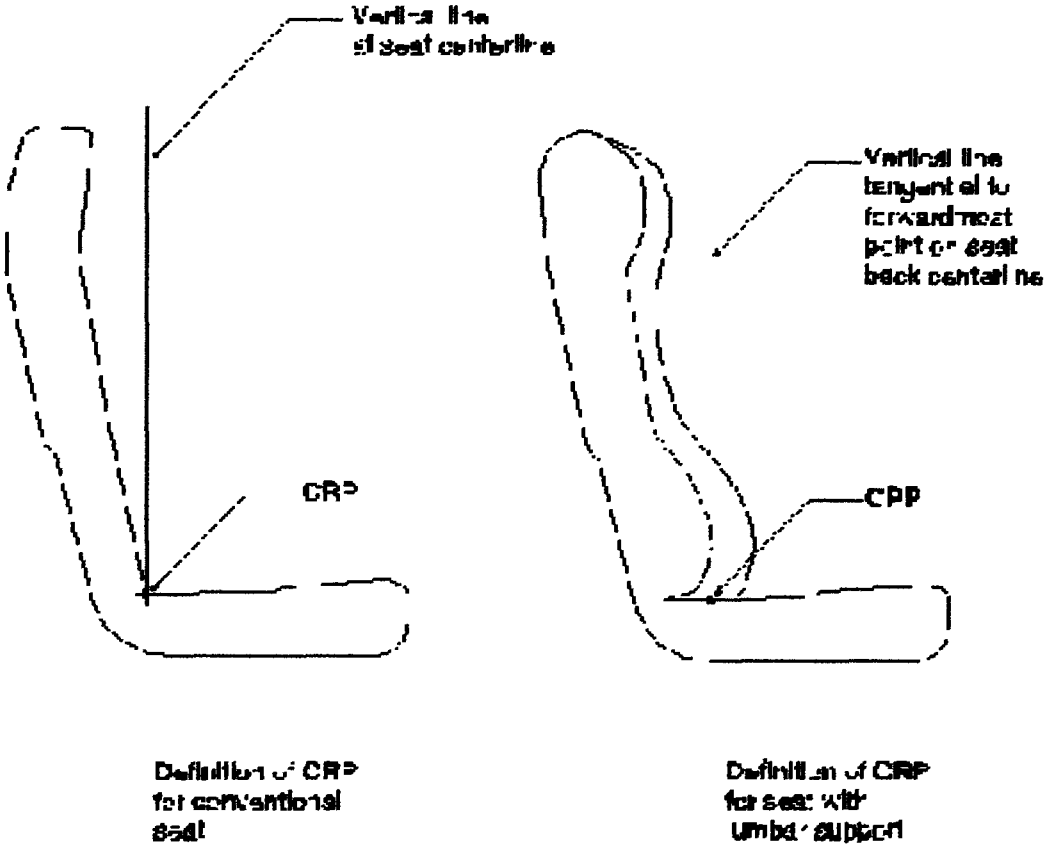
Figure 1c – Pre-amendment 25-64 Head Strike Zone



CRP: Cushion Reference Point. The cushion reference point is defined as the intersection of the top surface of bottom cushion and a vertical line tangential to the forward most point of the seatback, measured at the center of the seat back with the seat back in the full upright position. If the seat has adjustable lumbar support, this support should be deployed in its most "forward" setting to determine CRP.

This procedure for locating CRP is applicable only for aircraft without 25.562(c)(5) as part of the certification basis. It is used to determine the 35-inch

head strike zone. .



Definition of CRP for conventional seat

Definition of CRP for seat with limited support

4.0 General Seat Design for Edges and Corners and Projections

4.1 Design Criteria for the Head Strike Zone

FAR 25.785 requires passengers be protected from serious head injury by use of a safety belt plus the elimination of any injurious object within striking radius of the head. This applies to use of the seat in in-flight situations and emergency landing scenarios.

For aircraft that are not required to comply with 25.562(c)(5), the head path is 35 inches from the cushion reference point (CRP). The width of the head strike zone extends to the inner surfaces of the armrests (or in the absence of an armrest, the restraint anchor points) (see Figure 1).
Any object which can be contacted which is 18 inches or greater above the floor should be considered in the head strike zone and assessed for sharp edges and projections using the Table A below.

For aircraft that must comply with FAR/JAR 25.562(c)(5), the head path is determined by dynamic tests/analysis conducted for 25.562 compliance.

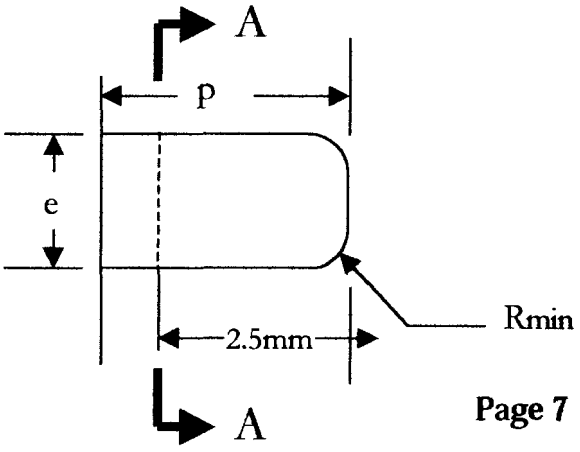
The design criteria outlined in the table below are used to determine if a seat feature is considered a hazardous object/projection. If it is not considered a hazardous object/projection, no further action is required (e.g. no padding is required). If it is considered a hazardous object/projection and it is in the head path, the object must be padded per 25.785(k).

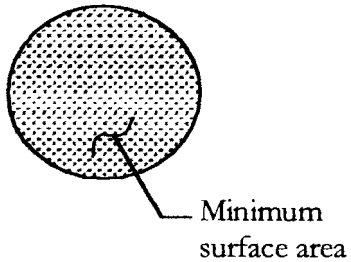
Table A - Design Criteria for Interior Compliance Inspection

Projection in the Contact Region (See figure below)	Minimum radius	Minimum Cross Sectional Area (measured @ 2.5 mm from contact surface perpendicular to the surface)
0 – 3.2 mm	2.5 mm*	N/A
3.2 mm – 9.5 mm	2.5 mm	2.0 cm^2
9.5 mm – 25.0 mm **	3.2 mm	6.5 cm^2
Exposed Edges in the Contact Region (See Figure 2 below)	3.2mm	6.5 cm^2 or greater
Corners	3.2mm	

* If the width is less than 2 times the projection (e < 2p), the minimum radius is 0.5 mm (blunt edges). [Width = e; Length of Projection = p]

** **Larger projections within this range should be oriented such that they are not in line with the head strike path. Designs should "shelter" these types of projections from direct head strike. Projections longer than 25.0 mm should be considered on a case-by-case basis with the appropriate regulatory agency.**





View A-A

Figure 1

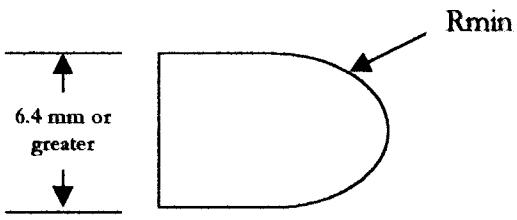


Figure 2

Reference:

1. NASA-STD-3000, volume 1, Rev B July 1995
2. 16 CFR 1500.48, Technical requirements for determining a sharp point in toys and other articles intended for use by children under 8 years of age.
3. 16 CFR 1500.49, Technical requirements for determining a sharp metal or glass edge in toys and other articles intended for use by children under 8 years of age.
4. 49 CFR 571.201 S3.4 Sun Visors
5. Economic Commission Europe, Regulation 21.01 Supplement 2, Interior Fittings.
6. 74/60/EEC & 78/632/EEC, Interior Fittings.
7. U.S. Consumer Product Safety Commission Publication 325, Handbook for Playground Safety, sections 9.1-9.5.

When assessing protrusions that may be contacted by the head, the potential orientation of the contact, by the head should be considered. For example, an object mounted on a seatback may be contacted by a person, during turbulence or emergency landing conditions, in a downward motion or a direct horizontal impact but would not be impacted in an upward motion.

Soft materials (for example, fabric, thin thermoformed plastics, foam or rubber) do not have minimum radius criteria since they do not pose an occupant injury hazard.

4.2 Consideration of Provisions for Seat Back Accessories

A seating system may be designed so that optional equipment, in the head strike zone, may be installed at some future time (e.g. a cutout in the seatback structure for a telephone or video monitor). The provisions should be assessed as detailed in the table above. If the provision results in a bare metal edge, it is not sufficient to simply hide the metal edge with

a dress cover. It should be designed to either present a radius as shown in the table above or there should be a shield to deflect a head from directly contacting the edge (e.g. cover the area with a protective thermoplastic shroud etc.). The provision covering may require data/analysis demonstrating that it will not, in itself, produce sharp edges upon impact in an emergency-landing situation (for example, the cover for accessory provisions may be supported by 16g HIC test data, component test data, design experience, etc. to substantiate that it will not fracture with injurious fragments).

A separate assessment of the accessory should be conducted when it is installed into the seat back. This assessment should be conducted as part of the compliance finding for installing this equipment (for example, an injury assessment should be conducted when installing a seat back telephone into previously designed provisions during an STC certification).

5.0 Certification of In-Arm Monitors

5.1 General

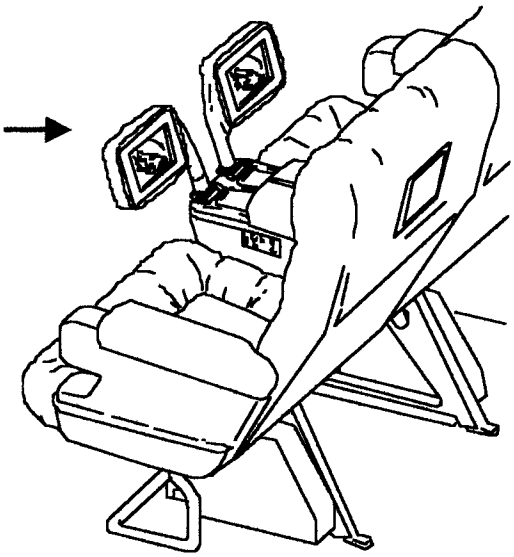
Design of in-arm video monitors should consider three scenarios:

- Contact with arm and monitor during normal use by the passenger/cabin crew member
- Performance of the arm and monitor in an abuse loading scenario
- Performance of the arm and monitor in an emergency landing scenario

These three scenarios can be evaluated independently of each other. For the second scenario, post abuse-load sharp edges must be evaluated. For the third scenario, blunt trauma from an emergency landing head strike should be evaluated if applicable.

	Blunt Trauma	Post-Impact Sharp Edges	Design Standards
9g	No Test*	SAE ARP	Industry Standards
16g	No Test*	SAE ARP	Industry Standards

* For systems stowed for taxi, takeoff and landing



5.2 Normal Use

In-arm video units, just as all seat components, must be designed such that they do not present an injury hazard to the occupant (either seated or moving about the cabin during flight). The edge/corner design criteria outlined in Section 4.0 is sufficient to accomplish this. If the design criteria in Section 4.0 are employed, it is considered sufficient to eliminate injury potential for the seated occupant during turbulence. No minimum break-over force for the in-arm video is required.

5.3 Abuse Loading

Design of the in-arm video unit must consider the potential for an occupant to use the arm/monitor to assist them in entering or exiting the seat. In addition, the design must consider the potential for a passenger to fall into the arm/monitor while moving about the cabin under normal or turbulent flight conditions.

To assess the adequacy of the design to minimize injury resulting from abuse loading, ARP 5475 may be used as an accepted practice to substantiate the video arm/monitor combination pending approval by SAE. After an abuse test, the exposed fractured surfaces of the test article should be evaluated for sharp edges.

5.4 Emergency Landing Conditions

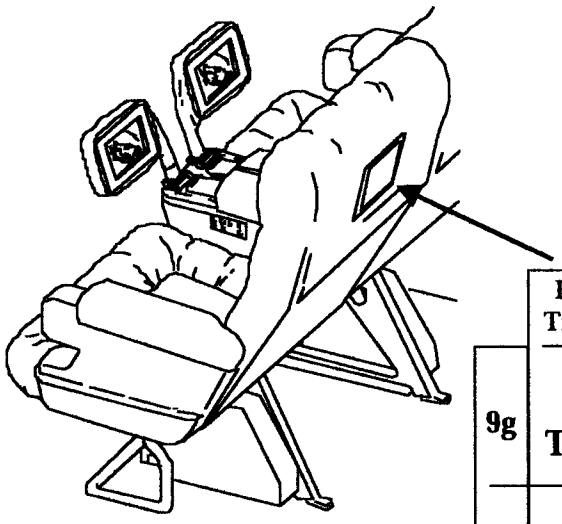
An evaluation of the in-arm video monitor shall be conducted for emergency landing conditions. This shall consist of evaluating the retention of the arm/monitor for the emergency landing loads in FAR/JAR 25.561 (and 25.562 as applicable).

In the unlikely event that the monitor/arm are exposed to head strike during takeoff, taxi and landing, a blunt trauma impact evaluation is required:

- The tests outlined in Appendix A (for aircraft without FAR/JAR 25.562(c)(5) in the certification basis)
- or a HIC test (for aircraft with FAR/JAR 25.562(c)(5) in the certification basis)..

This evaluation for emergency landing conditions does not have to be accomplished in conjunction with abuse load testing in section 5.3 above.

6.0 Certification of Seat Back Mounted Accessories



	Blunt Trauma	Post-Impact Sharp Edges	Design Standards
9g	No Test (1)	Impact Test	Industry Standards
16g	HIC Test	HIC Test	Industry Standards

(1) Impact test is required for objects greater than 3lbs

6.1 Normal Use

Seat back mounted accessories, just as all seat components, must be designed such that they do not present an injury hazard to the occupant (either seated or moving about the cabin during flight). The edge/corner design criteria outlined in Section 4.0 is sufficient to accomplish this.

6.2 Emergency Landing Conditions

An evaluation of seat back mounted accessories shall be conducted for emergency landing conditions. This includes evaluation of these accessories for both blunt trauma criteria and evaluations of seat back accessories for post-impact sharp edges.

It is understood that standard, in service aircraft seat back designs that have no accessories attached (example, telephones, video monitors, etc.) have been previously determined to be compliant with FAR 25.785. The addition of accessories to the seat back should be evaluated to ensure that passenger safety is not compromised. The two injury mechanisms outlined below should be kept in mind when considering the certification of seat back mounted accessories. In general, the decision to require a specific test should be based on engineering judgement and should be justified in the same manner, as would the decision to not require a test.

6.3 Blunt Trauma – General Discussion

Blunt trauma is incurred when the occupant's head rapidly decelerates when it strikes an object. Several factors influence the severity of blunt trauma incidents. Strike target mass and stiffness are the primary factors.

6.3.1 HIC in Certification Basis

For aircraft that have FAR/JAR 25.562(c)(5) as part of the certification basis, a row-to-row HIC test per 25.562(c)(5) is sufficient for showing compliance to the blunt trauma criteria.

6.3.2 No HIC in Certification Basis

For Pre-Amendment 25-64 aircraft, it is acceptable to show compliance to 25.785 by padding an object with one inch of energy absorbing foam. If the seat back stiffness and inertia are the

dominant factor in blunt trauma impact, it is equally acceptable to demonstrate that the seat back permanently deforms at least one inch in order to be equivalent to one inch of padding. This is acceptable as a method of compliance as long as the seat back is the predominant factor in the head-strike scenario. If the total weight of the seat back mounted accessories is less than 3 pounds, 16g dynamic test data indicates that the seat back is the predominant factor Industry data indicate that standard seat back designs generally provide more than one inch of permanent deformation. Data substantiating seat back deformation is not required for seat backs unless the seat back design contains unusual features that significantly increase the stiffness of the seat back.

Using this same logic, the addition of items of mass weighing less than three pounds to a seat back are not observed to produce a significant influence on the dynamic performance of a seat. Thus these installations are judged to provide an equivalent level of safety if the installation produces one inch of permanent deformation at the top of the seat back, or in the region of the head strike.

For aircraft that do not have FAR/JAR 25.562(c)(5) as part of the certification basis, a threshold criterion of three pounds has also been determined as the basis for requiring test data for compliance substantiation.

For aircraft that do not have FAR/JAR 25.562(c)(5) as part of the certification basis, the sum total weight of the seat back accessories (items added to the seat back that are not part of the a single seat back structure or the seat back tray table design) that do not sum more than 3 pounds do not need further substantiation for the blunt trauma criteria.

Seat backs may still need to be evaluated for the general design criteria and/or the post-impact sharp edge criteria outlined in this concept paper.

Industry data indicates that standard seat back designs generally provide more than one inch of permanent deformation. Data substantiating seat back deformation is not required for seat backs

unless the seat back design contains unusual features that significantly increase the stiffness of the seat back.

6.3.3 Items more than 3 pounds

For aircraft that do not have FAR/JAR 25.562(c)(5) as part of the certification basis, if the sum of seat back accessories is greater than three pounds, an evaluation must be made for the blunt trauma criteria. To accomplish this, testing shall be accomplished as outlined in Appendix A (or other method found acceptable by the appropriate regulatory agency).

Note: Appendix A provides accepted component test methods. Any new component test method should be validated against full-scale data acquired under similar conditions, prior to use as a certification tool. While linear correlation is not necessary, the component method should consistently rank impact surfaces the same way they would be ranked under full-scale conditions. The test method should be demonstrated to be repeatable, ***for the type of surface being tested.***

In addition to blunt impact, a review of the general design criteria and/or for post-impact sharp edges may be required as outlined in this concept paper.

6.4 Sharp Edges

6.4.1 Evaluation of Seat Back Accessories for Aircraft not containing FAR/JAR 25.562(c)(5) in their certification basis

Components that are mounted as seat back accessories must be designed such that their failure mechanisms upon impact will not yield sharp edges (showing compliance to FAR/JAR 25.785(k)) if the component can be struck by the head (see section 5). If an object is in the head strike zone, it should be tested using an impact test outlined in Appendix A. A component may be tested on a seat back, or independent of the seat back since it is the component that is being evaluated, not the installation. Once data is collected on

one type of component, it should be readily applied to similar components if they are expected to produce similar performance.

During the impact evaluation for sharp edges, the blunt trauma criteria (e.g. HIC) does not need to be measured if this data is not required in the section above (for seat back mounted accessories less than 3 pounds).

6.4.2 Evaluation of Seat Back Accessories for aircraft that have FAR/JAR 25.562(c)(5) as part of the certification basis

Components that are mounted as seat back accessories must be designed such that their failure mechanisms upon impact will not yield sharp edges (showing compliance to FAR/JAR 25.785(k)) if the component can be struck by the head when evaluated in accordance with §25.562 (see section 5).

Appendix A

Component Test Methods

Airplanes without §25.562(c)(5) in the Certification Basis

A1.0 General Discussion for Component Testing

Component tests to demonstrate delethalization for seatbacks on airplanes that do not have § 25.562(c)(5) in their certification will generally be limited to those instances where installed items (e.g., telephones, video) exceed 3lbs, or the seatback does not provide deformation. Seatbacks with items that weight less than 3 lbs. will likely be shown to provide adequate energy absorption and airplanes with § 25.562(c)(5) in their certification basis will require compliance with HIC.

Component Testers should provide an absolute assessment of potential head injury, rather than a comparison of one surface with another. Devices such as the FMH, or Pendulum-Head testers should strike the seatback as near to perpendicular as possible.

The bowling ball test in AC 25-17 is considered an acceptable method of demonstrating compliance to section 25.785. This method accelerates an object with a mass of 13 pounds to a minimum velocity of 34 fps in order to generate an impact energy. The component test methods described below outline alternate objects to accelerate which are consistent in mass (for example, the use of an ATD head form instead of a bowling ball). They also outline alternate methods of acceleration, which yield the same minimum impact velocity (for example, the use of a pendulum or pneumatic piston instead of gravity for acceleration).

A minimum head impact velocity of 34-fps (assuming an approximate head mass of 13lbs) is an acceptable level to address the pre-amendment 25-64 case. This is the head velocity that is generated by the bowling ball test per AC 25-17 (see section 1.0 below). Under these conditions, the methods described in this appendix have been determined to measure an acceptable level of head injury protection, in accordance with the requirements of section 25.785. These methods have not been correlated with HIC as measured under full scale dynamic testing, but are considered acceptable for purposes of determining compliance to section 25.785 for airplanes that do not have section 25.562(c)(5) in their type certification basis.

Acceptable means of determining compliance is:

(a) The impact velocity must be a minimum of 34 feet per second (fps)
(b) Peak accelerations shall not exceed 200g;

(c) Accelerations in excess of 80g shall not exceed a cumulative duration of 3.0 milliseconds.

The test plan would specify the pass/fail criteria in advance of the test along with the data filtering techniques employed. In addition, it is acceptable to perform a comparative test/analysis between a seat back without accessories and the same seat back with the accessories mounted. It must be demonstrated that the seat back with the accessories has the same or lower acceleration profile as compared to the seat back without the accessories.

Although not a regulatory requirement, seatbacks are recommended to restrict break-over, which has been shown to reduce head injury potential.

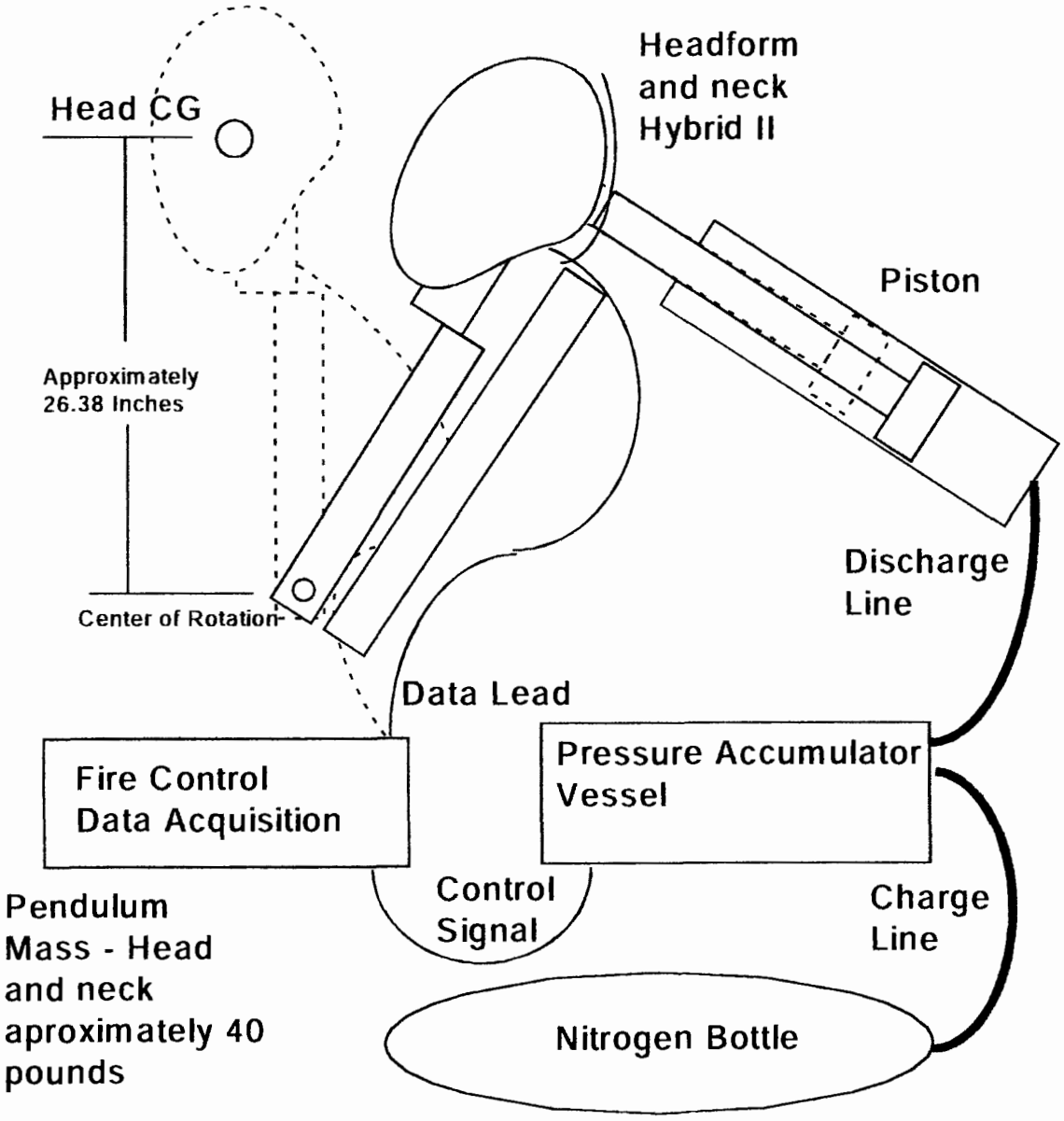
A1.0 The Bowling Ball Test

The bowling ball test as described in AC 25-17 and modified by FAA letter written 13JUL94. [Attached] (Note: the draft AC 25-17a incorporates the FAA letter 13JUL94 guidance). This test method can be used to generate an acceleration profile to be used with the pass/fail criteria noted above. It can also be used to generate rebound energy to be used as a comparison test as outlined in the FAA guidance material.

A2.0 The Head Component Tester (HCT)

The head component test device is a Hybrid II ATD head and neck mounted on a pendulum. The head/neck assembly is accelerated with a pneumatic piston to achieve the desired impact velocity. The ATD head is instrumented with an accelerometer that records the deceleration forces associated with the impact.

Schematic Diagram
Head Component Test Device



Impact velocities in excess of 40 ft/sec acheiveable

Test Setup

The item to assess (telephone, video screen, etc.) should be mounted in a seat back and a conveniently available seat structure that shares the appropriate mounting points for the seat back (pivot point, recline mechanism mounting) will be used to locate the seat back relative to the HCT. Note it is not necessary to represent a production seat except for the seat back and its attachment to structure.

The test setup will assure that the article is struck with the forehead of the ATD and an impact velocity of 34 ft/sec is achieved. SAE J211 compliant data accelerometer data and high-speed video for documentation are required.

Figure 1, HCT Test Setup below, is an example of the test setup, which depicts the location of the HCT center of rotation. The center of rotation is the only variable for strike orientation. Since the HCT overall arm length (pivot arm, neck and head) is less than 35", (26.38 inches), the center of rotation for the HCT cannot be placed at the seat CRP. A point along a ray between the CRP and the impact location will be used to locate the center of rotation for the HCT. This point will be 26.38" away from the terminus of the ray at the point of contact with the target. This point will insure that the ATD head will most closely mimic the intended trajectory of the occupant at the point of impact.

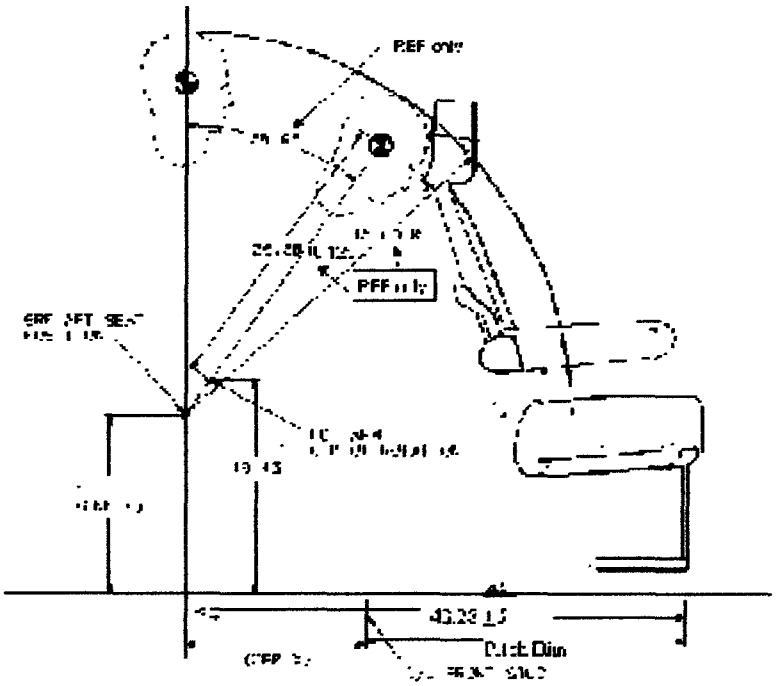


Figure 1 , HCT Test Setup

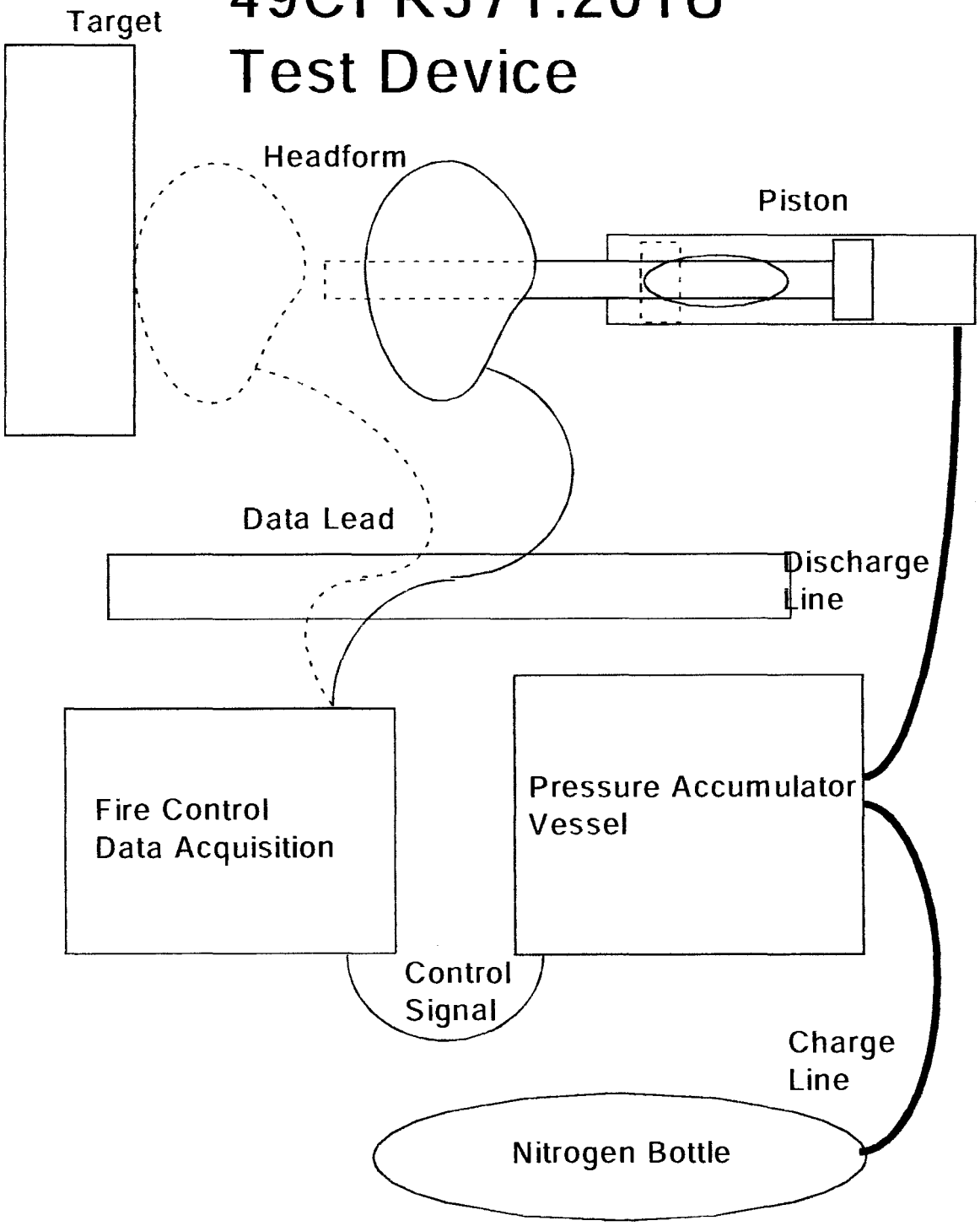
A3.0 Free-Motion Head Form (FMH)

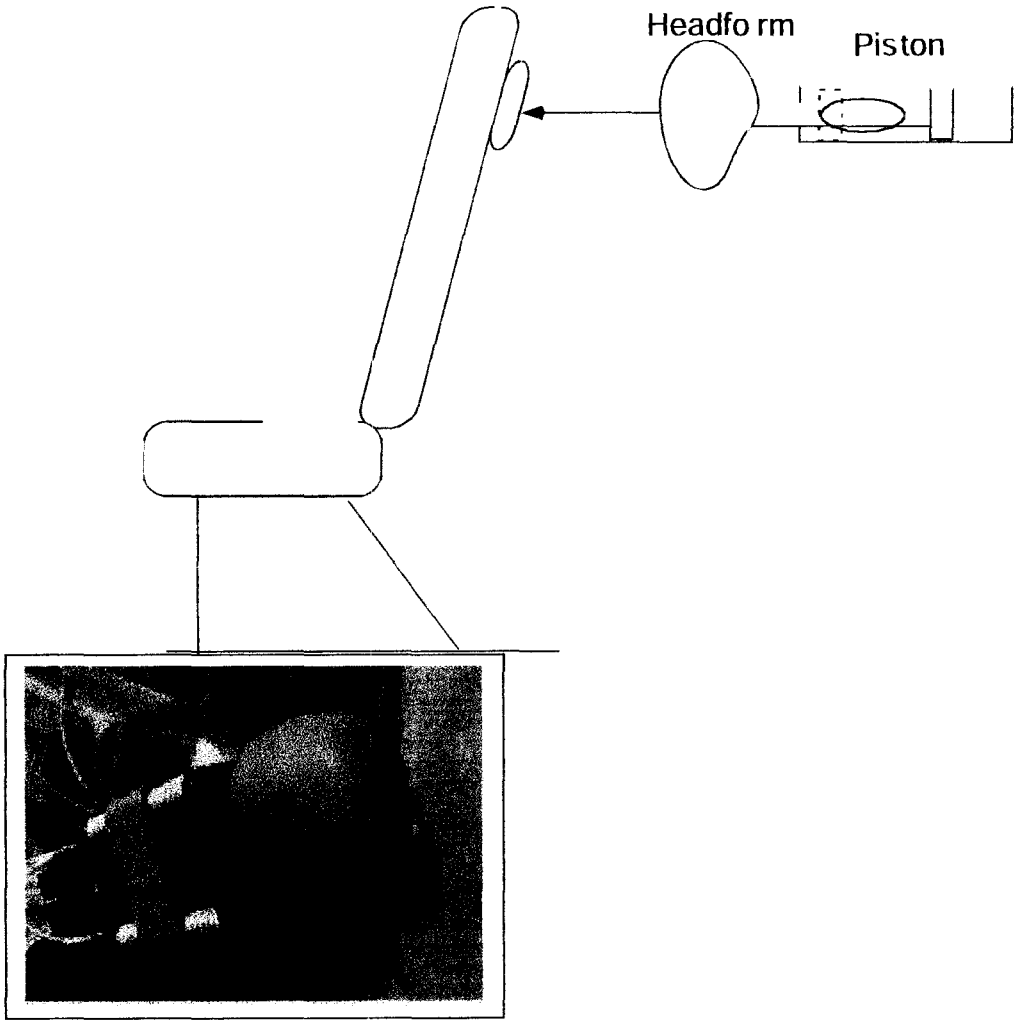
The FMH is currently used by the automotive industry to demonstrate compliance to Federal Motor Vehicle Safety Standard (FMVSS) 201U.

This device can be used in similar manner for FMVSS 201 for compliance to FAR25.785. The item to assess (telephone, video screen, etc.) should be mounted in a seat back and a conveniently available seat structure that shares the appropriate mounting points for the seat back (pivot point, recline mechanism mounting) will be used to locate the seat back relative to the FMH. The FMH should strike the center of the target with the forehead. Using an impact velocity of 34 feet per second, the FMH would be fired at the target horizontal to the floor. SAE J211 compliant data accelerometer data and high-speed video for documentation are required.

The figure above is an example of the test setup, which depicts the location of the FMH approaching the target horizontal to the ground.

Schematic Diagram 49CFR571.201U Test Device





Reference: National Highway and Traffic Administration report DOT HS 807 865 title: "Upper Interior Head Protection Volume I: The Development of a Research test Procedure" and "Upper Interior Head Protection, Volume II: Fleet Characterization and Countermeasure Evaluation"

A4.0 16g Test in accordance with FAR/JAR 25.562(c)(5)

A 16g forward row-to-row HIC test in accordance with FAR/JAR 25.562 (c)(5) may be performed, or similarity analysis based on full-scale test data may be completed. . A 0-degree yaw test, with the seat pitched so that there is a head strike on the component to be assessed is acceptable. The seat back and its attachment to structure must be representative to the production seat. HIC <= 1000 is the pass/fail criteria.

Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

Subject: INFORMATION: Policy Statement on Conducting Component Level Tests to Demonstrate Compliance with §§ 25.785(b) and (d)

Date: May 9, 2005

From: Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM-100

Reply to Attn. of: ANM-03-115-31

To: See Distribution

Regulatory Reference: §§ 25.785(b) and (d)

The purpose of this memorandum is to provide Federal Aviation Administration (FAA) certification policy on conducting component level tests in order to demonstrate compliance with the requirements of §§ 25.785(b) and (d). The tests described herein provide a standardized approach by which each potentially injurious item located within the headstrike zone can be assessed for occupant injury potential. These test methods are the product of an Aviation Rulemaking Advisory Committee recommendation and are harmonized with the Joint Aviation Authorities (JAA) and Transport Canada.

Although this policy memorandum focuses primarily on describing component level tests for seatback mounted accessories installed within the striking radius of the head, the same test methodologies can be applied more generally to any surface or other items that may be potentially injurious and are located within the headstrike zone (e.g., escape slide bustles, and tables, etc.) that need to be addressed for compliance with §§ 25.785(b) and (d).

In addition to §§ 25.785(b) and (d) blunt trauma requirements, some aircraft certification bases include the additional (and more stringent) requirements of § 25.562(c)(5). For these airplanes, protection must also be provided so that the head impact does not exceed a head injury criterion (HIC) measurement of 1000 units. The tests described herein do not address compliance with § 25.562(c)(5) HIC requirements.

Current Regulatory and Advisory Material

Section 25.785(b), Amendment 25-88, requires that each seat, berth, safety belt, harness, and adjacent part of the airplane at each station designated as occupiable during takeoff and landing be designed so that a person making proper use of those facilities will not suffer serious injury in an emergency landing as a result of inertia forces specified in §§ 25.561 and 25.562.

Section 25.785(d), Amendment 25-88, requires, in pertinent part, that each occupant of a forward or aft facing seat be protected from head injury by the elimination of injurious objects within the striking radius of the head.

These same occupant injury protection requirements have existed within § 25.785 (with the exception of reference to § 25.562 which was added by Amendment 25-64) since the adoption of part 25. As such, the policy contained within this memorandum can be utilized for demonstrating compliance with § 25.785 at all amendments. This policy cannot, however, be used in lieu of HIC testing for airplanes whose certification bases specifically require compliance with the requirements of § 25.562(c)(5). Attachment 1 provides additional information for determining how certification bases considerations affect the applicability of the tests described herein.

In order to demonstrate compliance with §§ 25.785(b) and (d), two injury mechanisms must be examined. The first consideration is blunt trauma injuries experienced by the occupant resulting from the crash loads. This policy memorandum describes three impact test methods that can be used to evaluate blunt trauma injuries. The second injury mechanism is sharp or injurious edges or features. Sharp or injurious edges or features could cause additional injury and thus impede occupants from exiting the airplanes after a crash; they are therefore not acceptable. They are not allowed as design features of airplane interiors, nor are they allowed to be formed as a result of the impact tests described within this policy memo. Both injury mechanisms (i.e., blunt trauma and sharp or injurious edges or features) must be successfully addressed in order to make a determination of compliance with the requirements of §§ 25.785(b) and (d).

Advisory Circular (AC) 25-17, paragraph 81b(4), as supplemented by FAA memorandum dated July 13, 1994, provided a method for demonstrating compliance with § 25.785 blunt trauma requirements using a comparative bowling ball test. This approach allowed an applicant to compare the characteristics of a new (i.e., unapproved) feature against a previously approved configuration. If the blunt trauma characteristics (measured by bowling ball impact accelerations) associated with the new feature were less severe than the previously approved configuration, they were considered acceptable. Advisory Circular 25-17 also described an assessment of the test article for sharp or injurious edges or features post-test.

We recognized that there were shortcomings with the bowling ball test policy as it was originally published. Because of these shortcomings, we noted in the July 13, 1994, memorandum our intent to develop more comprehensive policy on this subject. As such, this policy memorandum supersedes the guidance contained in AC 25-17, paragraphs 81b(4)(i) through b(4)(iv) regarding the bowling ball test pass/fail criteria and the subsequent FAA memorandum on this same subject, dated July 13, 1994.
Likewise, the impact device described in Society of Automotive Engineers (SAE) standard J921 essentially performs the same function as the bowling ball test and therefore is also no longer acceptable for demonstrating compliance with the

requirements of §§ 25.785(b) and (d). This policy memorandum does not supersede any of the other methods of compliance pertaining to §§ 25.785(b) and (d) contained within AC 25-17. The remaining allowable methods of compliance described in AC 25-17 include padding potentially injurious surfaces and relocating objects outside of the headstrike zone.

Implementation of this new policy memorandum does not nullify any previously completed compliance determinations. However, all new compliance determinations should be made in accordance with this policy memorandum, the remaining methods of compliance identified in AC 25-17, or other methods of compliance established through the issue paper process.

Policy

Sections 25.785(b) and (d) require that seatbacks, components mounted on the seatbacks (such as video monitors, telephones, cup holders, etc.), and any other objects located within the striking radius of the head, be designed to prevent serious injury to an occupant whose head would impact the objects as a result of the emergency landing inertia forces.

We have determined through 16g row to row dynamic tests that seatback accessories totaling less than three pounds do not exceed the performance criteria described below when installed in seatbacks that provide at least one inch of permanent deformation. Industry data indicate that "standard" airline passenger seatback designs generally provide more than one inch of permanent deformation. As a result, data substantiating seatback deformation is not required unless the seatback design contains unusual features that significantly increase the stiffness beyond that of traditional passenger seats.

If the seatback has been stiffened such that the one-inch permanent deformation assumption is questionable, testing may be required. For example, a business class pod seat with a separate composite seatback privacy shroud would not be considered a "standard" seatback and may require further investigation. Standard seatback designs containing accessories whose combined weight is less than three pounds can be accepted without further assessment for blunt trauma injury potential. These items still require assessment for the creation of sharp or injurious edges or features resulting from occupant impact.

In order to generate compliance determinations for which the objectives may be clearly met, the test methods require, by necessity, determinate pass/fail criteria. As noted in this policy, other acceptable methods of compliance which may not meet these criteria may be proposed. The inclusion of determinate pass/fail criteria is a change from the approach that was previously accepted, which allowed approval based solely on comparative analysis. This change is necessary because the comparative bowling ball test could not adequately discriminate between injurious and non-injurious features. For example, a traditional seatback could have very effective energy absorption characteristics.

However, this very effective energy absorbing seatback could be modified to include an item such as an "XYZ brand" video monitor, which could result in *slightly* degraded energy absorption characteristics. Under these circumstances, applying the guidance provided in AC 25-17, as modified by the FAA memorandum dated July 13, 1994, would lead one to conclude that the video monitor installation was unacceptable.

The converse was also possible; an applicant could present a very rigid "standard" seatback that provided very little energy-absorbing capability. Because "standard" seatbacks have been traditionally accepted as being adequately delethalized by inspection, an applicant could then show by comparison that the addition of the same "XYZ brand" video monitor would slightly improve the energy-absorption characteristics of the seatback assembly due to the somewhat crushable nature of the video monitor screen. The applicant could then conclude that the monitor that was determined to be unacceptable in the first example would be acceptable in the second example, even though the seat in the first example would provide greater occupant injury protection. This was not the intent of the previous guidance; therefore, we have determined that changing to absolute pass/fail criteria is necessary.

Test Methods

In order to determine whether or not an item is "injurious" from a blunt trauma perspective, the item should be installed in a seatback and subjected to an impact test using either a 13 pound bowling ball, a Free Motion Headform as defined in 49 CFR part 572, subpart L, or a Head Component Test Device. Schematics describing each type of test and the corresponding pass/fail criteria are contained in detail in Attachments 2 through 4. If a seatback contains more than one potentially injurious item, the test should be repeated to strike each potentially injurious item using one of the test methods described in Attachments 2 through 4. Under all three test methods potentially injurious features are struck with a test device simulating a human head traveling at a minimum velocity of 34 ft./sec. The resulting peak accelerations should not exceed 200g's, and accelerations in excess of 80g's should not exceed a cumulative duration of 3.0 milliseconds.

In addition to the means of compliance described in Attachments 2 through 4, it remains acceptable to utilize the other means of compliance identified above.

Considerations for Seat Technical Standard Order (TSO) Authorization Holders

We believe that the vast majority of these types of component tests will be conducted on seats to address occupant injury considerations. When the seat manufacturer (TSO authorization holder) uses a seatback accessory manufacturer as a supplier, they assume responsibility for the integration of the accessory in the seatback (see AIR-100 memorandum, Policy and Guidance on the Approval of Electronic Components on

Aircraft Seating Systems, dated October 27, 1998). In this case these types of tests can be conducted in parallel with the seat TSO processes but cannot be approved under the TSO authorization (or Letter of Design Approval for foreign manufacturers). If the testing is done in parallel with a TSO approval, we will accept statements made by seat TSO authorization holders regarding the pass/fail criteria pertaining to the seatback mounted accessories.

The design approval for seatback accessories is not covered by the TSO authorization. Instead, the seat TSO design approval only covers the mass, location, and means of attachment of seatback accessories. Current industry practices show that most seat TSO holders do not wish to be held accountable for the design and manufacturing responsibility of accessories. In this case, design approval and installation approval of the accessories is the responsibility of the seat installer, even though the actual integration of the accessories into the seats is most likely accomplished by the seat manufacturer. Whether responsibility for the approval of the seatback accessories is assumed by the TSO holder or the seat installer, it is acceptable for seat manufacturers to conduct the tests described in Attachments 2 through 4 to determine the occupant injury characteristics. In either case, adequate test article definition is still required, but can be encompassed by the seat manufacturer's quality control system and conformity inspection processes.

A statement from the TSO authorization-holding seat manufacturer that the seatback-mounted accessories meet the pass/fail criteria described in this memorandum along with submittal of the resultant test data should be sufficient for the installer to make a determination of compliance with §§ 25.785(b) and (d). This may be a specific statement or encompassed in a more general statement, but cannot be included in the TSO applicant's statement of conformance (per § 21.605(a)(1)), nor any other documents associated with the TSO approval (e.g., installation limitations drawing/document).

An example of the latter is as follows: The seat installer (e.g., an airplane manufacturer) includes the text from § 25.785(b) and (d) in its seat interface requirements document (or equivalent) that all seat suppliers must meet, and specifically requires that all seatback mounted accessories be evaluated for occupant injury potential (i.e., blunt trauma and sharp or injurious edges) per this memorandum. The seat supplier, upon delivery of the seats, should provide the test data and a statement to the installer that all of the requirements of the interface document have been met, thereby enabling the installer to make a determination that the occupant injury concerns have been adequately addressed.

Sharp and Injurious Edges

As a result of the impact tests described above, sharp edges may be formed that are injurious or may impede egress. This is not acceptable. An assessment of sharp or injurious edges must therefore be completed for each seatback mounted accessory, or any other potentially injurious item located within the headstrike zone to determine compliance with the requirements of §§ 25.785(b) and (d).

We recognize that repeated tests may be necessary to develop and refine a seat/seatback accessory configuration that meets the occupant injury requirements. As such, the costs associated with utilizing production quality accessories for repetitive impact tests can become prohibitive. In order to help reduce the costs associated with these tests, we have determined that blunt trauma evaluations and evaluations of sharp and injurious edges or features can be performed independently, if so desired. The blunt trauma tests described in Attachments 2 through 4 can be conducted utilizing surrogate test articles in accordance with FAA Policy Memorandum ANM-03-115-28, dated October 2, 2003. Likewise, a component level assessment of sharp and injurious edges and features can be made of a seatback accessory by itself, if it is rigidly mounted in a test fixture and subjected to one of the test methods described in Attachments 2 through 4. If a seatback accessory does not show the propensity to create sharp or injurious edges when tested in a rigid fixture, this is sufficient to find compliance for the article as installed.

If testing with a surrogate test article yields unacceptable blunt trauma results, or an accessory develops sharp and injurious edges or features characteristics when tested while mounted in a rigid test fixture, it may be advantageous to more accurately represent the energy-absorbing characteristics of the seat and seatback accessory acting together as a system. In these cases it may be necessary to conduct the tests described in Attachments 2 through 4 on the accessory installed in the seatback assembly. If this testing approach still does not yield acceptable results, it remains acceptable to conduct testing to meet the HIC requirements of § 25.562(c)(5), and thereafter demonstrate that no sharp or injurious features were created.

Considerations for Airplane Manufacturers and Airplane Modifiers

An airplane manufacturer/modifier may also utilize the methods described above and in Attachments 2 through 4 to determine that features located within the striking radius of an occupant's head are non-injurious in accordance with §§ 25.785(b) and (d). In these cases, the development of an FAA-approved test plan, test article conformity, and test witnessing responsibilities must be coordinated with the aircraft certification office with oversight responsibility for the installation or modification in accordance with FAA Order 8110.4.

Effect of Policy

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a "binding norm." The office that implements policy should follow this policy when applicable to the specific project. Whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office (e.g., through the issue paper process or equivalent). Similarly, if the implementing office becomes aware of reasons that an applicant's proposal that meets this policy should not be approved, the office must coordinate its response with the policy issuing office.

Applicants should expect that the certificating officials will consider this information when making findings of compliance relevant to new certificate actions. Also, as with all advisory material, this policy statement identifies one means, but not the only means, of compliance.

Implementation

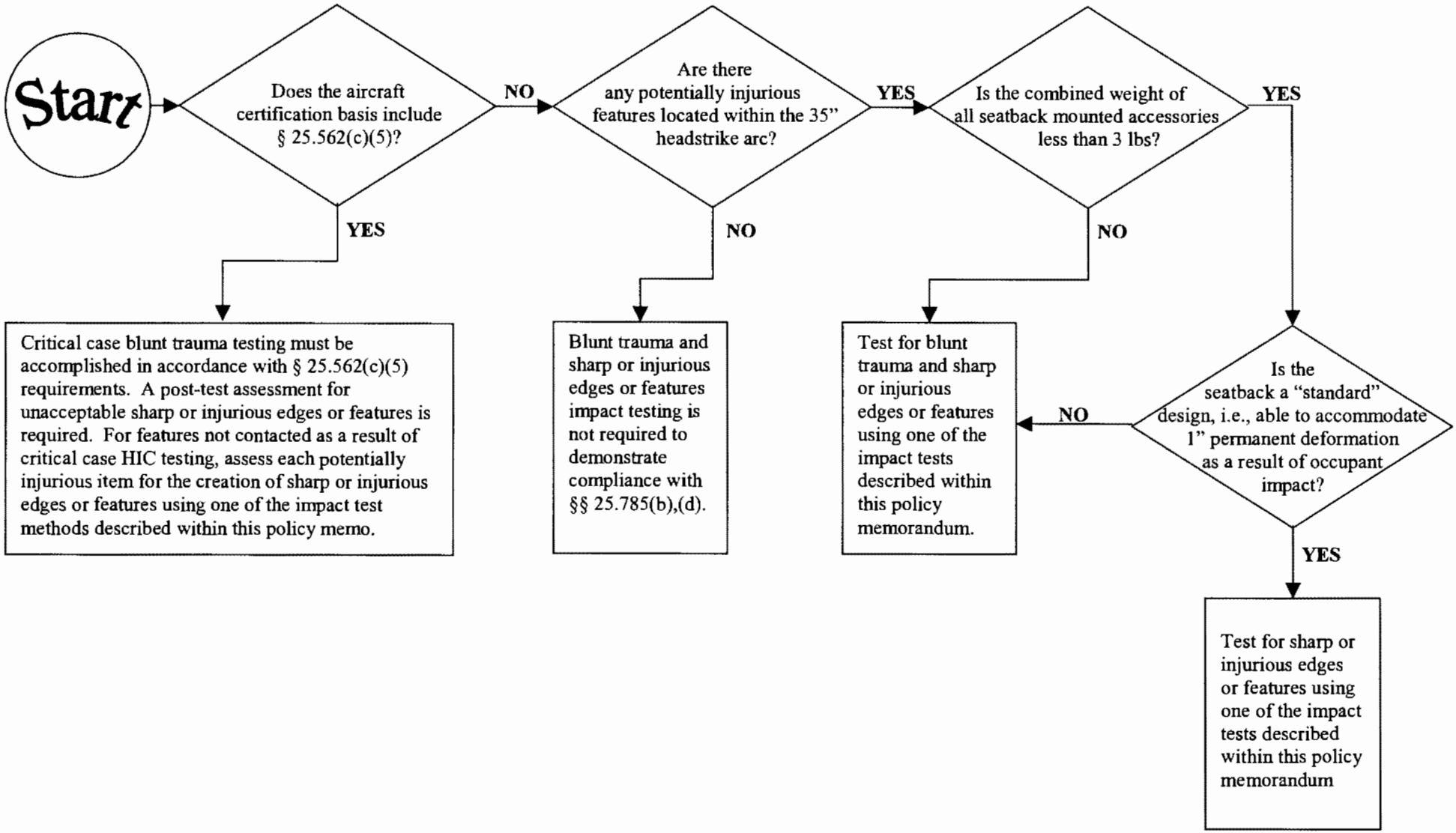
The compliance method discussed in this policy should be applied to type, amended supplemental, and amended supplemental type certification programs whose application date is on or after the date the policy is finalized. For existing certification programs whose application precedes the date this policy is effective and the methods of compliance have already been coordinated with and approved by the FAA or their designee, the applicant may continue to follow the previously acceptable methods of compliance or choose to follow the guidance contained in this policy.

/s/

Ali Bahrami

Attachments

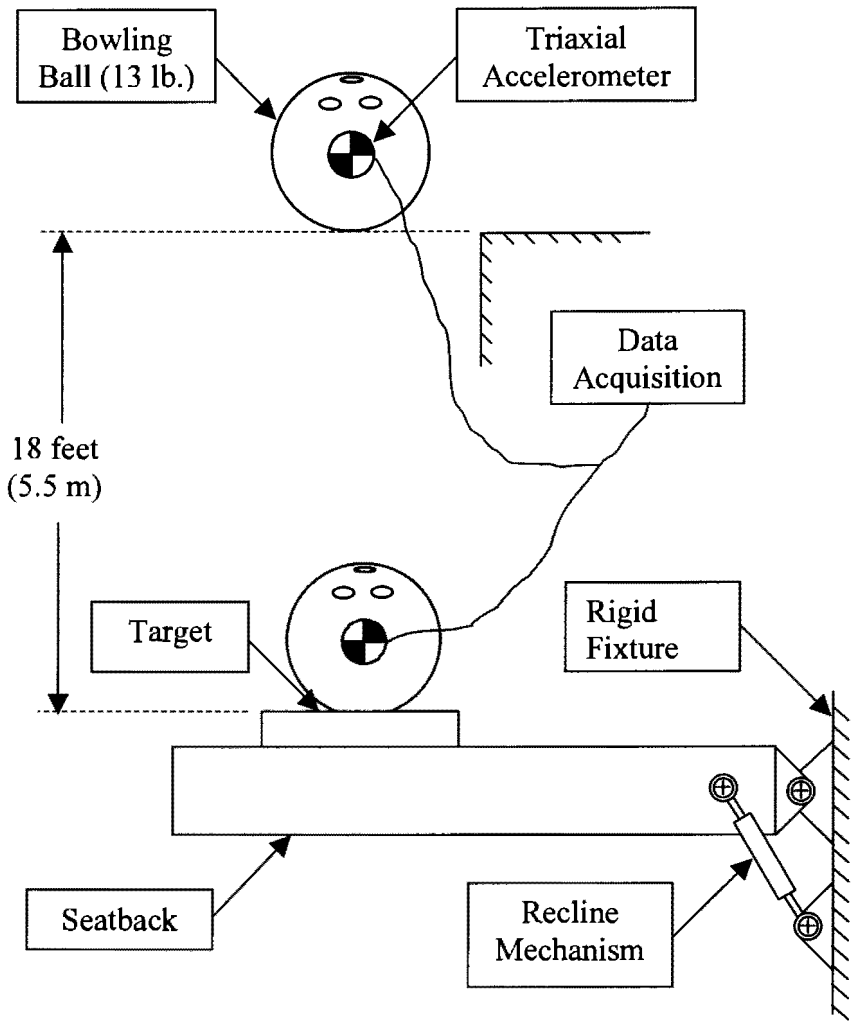
Attachment 1
23023
Process Flowchart



Attachment 2

23024

Bowling Ball Test Device



Bowling ball tests should be conducted with a bowling ball weighing a minimum of 13.0 lbs., and instrumented with a triaxial accelerometer that records the accelerations associated with impact. As such, this test device can be used to assess blunt trauma injuries, and investigate the propensity for components to create sharp and injurious edges. The following criteria describe the test requirements:

- Each potentially injurious seatback mounted feature within the 35" headstrike arc must be assessed. To the extent practicable, the test articles should be positioned in order for the dropped bowling ball to strike the center of each item, with a direction of motion that is perpendicular to the seatback/seatback mounted accessory. If the seat pitch is such that an item is located outside of the 35" headstrike arc, it need not be assessed.

- Each potentially injurious item should be mounted in a seat back that is connected to a rigid mounting fixture that shares the appropriate mounting points of the seat back (i.e., pivot and recline mechanism mounting). It is not necessary to represent a production seat except for the seat back, recline mechanism and their attachment to structure. As an option, it is acceptable to use a complete seat assembly, fastened to a rigid mounting fixture.

- The impact velocity must be a minimum of 34 ft./sec. Note: It is not necessary to measure the impact velocity provided the bowling ball is dropped from a minimum height of 18 feet above the impact surface.

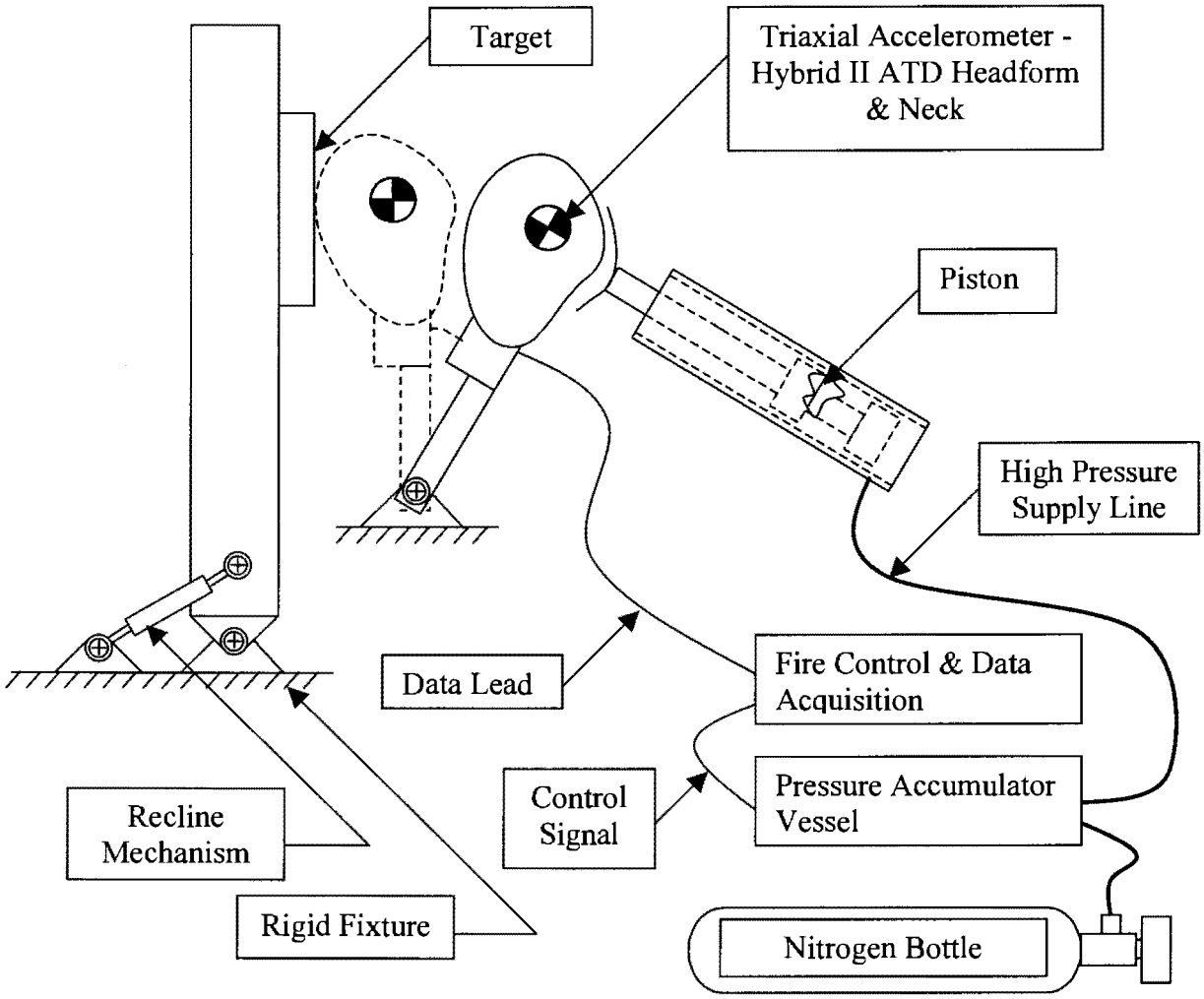
- Electronic instrumentation shall be accomplished in accordance with SAE J211. Accelerations shall be measured in accordance with the requirement of Channel Class 1000.

- Pass / Fail Criteria: Peak accelerations shall not exceed 200g's; accelerations in excess of 80g's shall not exceed a cumulative duration of 3.0 milliseconds. The impact shall not cause the formation of any sharp or injurious edges or features that may impede egress.

23025

Attachment 3

Head Component Tester



The head component test device is a Hybrid II Anthropomorphic Test Dummy (ATD) head and neck mounted on a pendulum. The head/neck assembly is accelerated with a pneumatic piston to achieve the desired impact velocity. The ATD head is instrumented with an accelerometer that records the acceleration forces associated with the impact. As such, this test device can be used to assess blunt trauma injuries, and evaluate the propensity for components to create sharp and injurious edges. The following criteria describe the test requirements:

- Each potentially injurious seatback mounted feature within the 35" headstrike arc must be assessed. To the extent practicable, the test articles should be positioned in order to be struck in the center by the headform, with a direction of motion that is perpendicular to the seatback/seatback mounted accessory. If the seat pitch is such that an item is located outside of the 35" headstrike arc, it need not be assessed.

- Each potentially injurious item should be mounted in a seat back that is connected to a rigid mounting fixture that shares the appropriate mounting points of the seat back (i.e., pivot and

recline mechanism mounting). It is not necessary to represent a production seat except for the seat back, recline mechanism and their attachment to structure. As an option, it is acceptable to use a complete seat assembly, fastened to a rigid mounting fixture.

- The ATD forehead should be the initial point of contact, and should strike the center of the target.

- The impact velocity must be a minimum of 34 ft./sec.

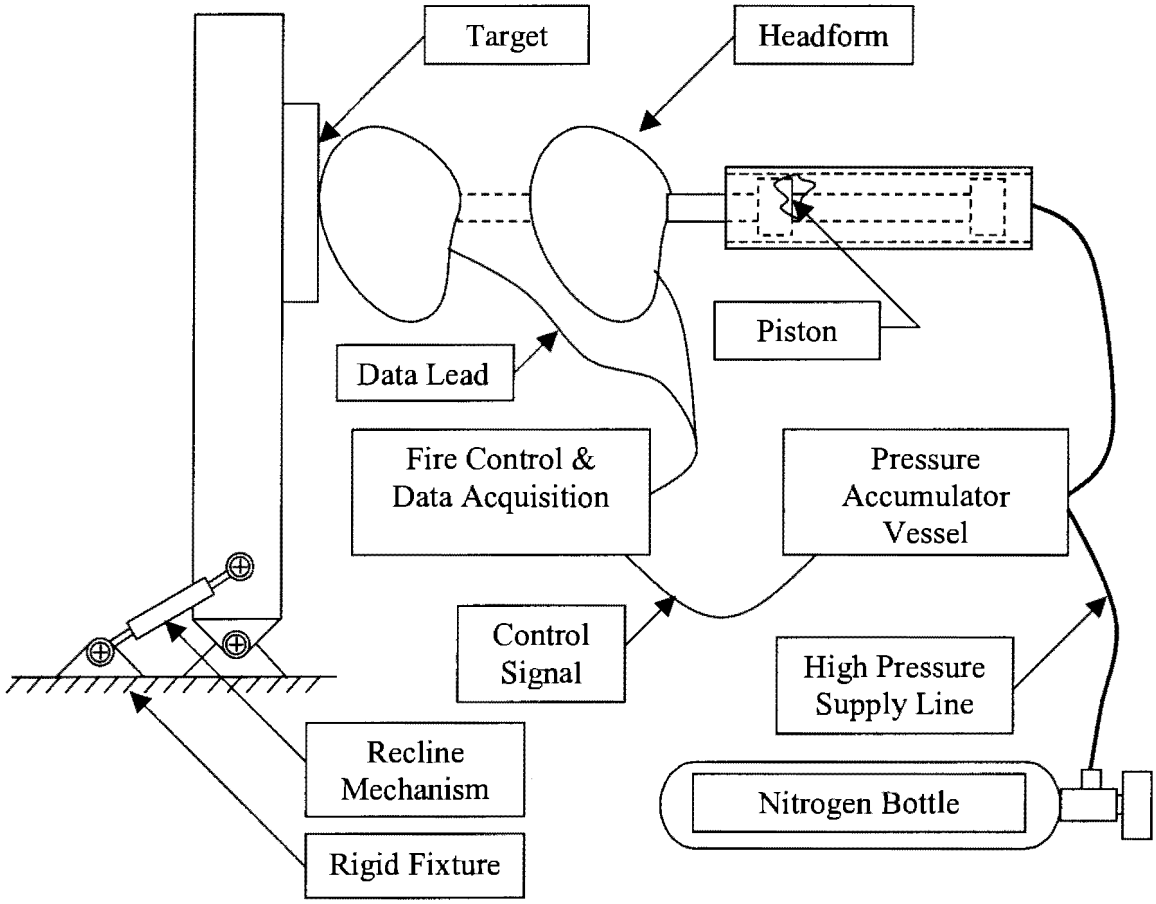
- Electronic instrumentation shall be accomplished in accordance with SAE J211. Accelerations shall be measured in accordance with the requirement of Channel Class 1000.

- Pass / Fail Criteria: Peak accelerations shall not exceed 200g's; accelerations in excess of 80g's shall not exceed a cumulative duration of 3.0 milliseconds. The impact shall not cause the formation of any sharp or injurious edges or features that may impede egress.

23024

Attachment 4

Free Motion Headform Test Device



The Free Motion Headform (FMH) device is defined in 49 CFR part 572, subpart L, and is used primarily by the automotive industry to demonstrate compliance to Federal Motor Vehicle Safety Standards (FMVSS) 201U. This device can be used in a manner similar to FMVSS 201 to evaluate blunt trauma injury, and to assess the propensity for components to create sharp and injurious edges. The following criteria describe the test requirements:

- Each potentially injurious seatback mounted feature within the 35" headstrike arc must be assessed. To the extent practicable, the test articles should be positioned in order to be struck in the center by the headform, with a direction of motion that is perpendicular to the seatback/seatback mounted accessory. If the seat pitch is such that an item is located outside of the 35" headstrike arc, it need not be assessed.

- Each potentially injurious item should be mounted in a seat back that is connected to a rigid mounting fixture that shares the appropriate mounting points of the seat back (i.e., pivot and recline mechanism mounting). It is not necessary to represent a production seat except for the seat back, recline mechanism and their attachment to structure. As an option, it is acceptable to use a complete seat assembly, fastened to a rigid mounting fixture.

- The FMH forehead should be the initial point of contact, and should strike the center of the target.

- The impact velocity shall be at least 34 ft./sec.

- Electronic instrumentation shall be accomplished in accordance with SAE J211. Accelerations shall be measured in accordance with the requirement of Channel Class 1000.

- Pass / Fail Criteria: Peak accelerations shall not exceed 200g's; accelerations in excess of 80g's shall not exceed a cumulative duration of 3.0 milliseconds. The impact shall not cause the formation of any sharp or injurious edges or features that may impede egress.

FAA Action: Dynamic Evaluation of Seat Restraint Systems & Occupant Protection on Transport Airplanes; Advisory Circular 25.562-1A-- Regulatory and Guidance Library