Fidelity
Flight Simulation

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Docket Management System
U.S. Department of Transportation
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Re: Federal Registry, Part II
Department of Transportation
Federal Aviation Administration
1 CFR Parts 1, 60, 61, 63, 141, 142
[Docket Number FAA-2002-12461]
RIN 2120-AH07
Flight Simulation Device Initial and Continuing Qualification and Use

Also attached are additional comments of Fidelity Flight Simulation, Inc.

Fidelity is highly encouraged by this attempt to enhance the standards of simulation. However we do have 2 points of significant difference that are both mentioned herein and embedded within the specific comments attached.

1. Of most significant difference is the natural tendency to create Part 60 as a "big simulator" regulation. Until recently, the General Aviation industry has not even been able to dream of any advanced type of simulation. This now can take place due to the recent advent of affordable, significant computing power.

Part 61 aviation shares the skies with us all and is a significant player in the national economy. Indeed many airline and military pilots have their roots in General Aviation. Anything that can be done to make training safer, more effective, and less expensive for not only the Part 141, and 142 schools but also for Part 61 pilots should be highly encouraged.

It should also be noted that significant aviation knowledge can be found among the instructors and schools operating under Part 61. Indeed, Part 61 allows for a significant usage of FSD's. It would be unfortunate if they could no longer be used in the development of dynamic curriculums at our nation's flight schools.

2. Sponsor record keeping and QAP requirements, which are important, are set at the same standard as that of major carriers. This will have a major economic impact on sponsors and will make a simulation program unaffordable to many.

General Aviation needs additional FSD's operating both in current traditional, instructional methods, and also incorporated into newer real time, task loaded lessons such as one would find in real skies. Furthermore, the need for motion during early training may be even more critical and beneficial than it is during airline training. This has not been available until now and should be highly encouraged.

Thank you,

Gary Van Drie
VP Project Development
Fidelity Flight Simulation, Inc.

Comments Applicable to Part 60 and Appendices B & D

"Large Program QAP, Lack of Part 61 Training Considerations"
§60.5(e)(f) QPS in Appendices B & D

Discussion

1. In general the requirements for the quality assurance program (QAP) are very steep for the flight school operator who has just a Level 2 or 3 FTD. The QAP requirements in this Part are identical to what a major carrier has to do in its simulation program. This makes the cost and "hassle factor" very large for the smaller operators. Admittedly, the NSPM wants a quality FSD program in this country, but this raises the bar too high for the smaller operators.

2. Also paragraph (e) does not mention Part 61 General Aviation schools. See discussion below in comments dealing with §60.7.

Proposed Changes

1. Reduce the QAP paperwork and efforts required to stay compliant with Part 60.

2. Allow the qualification and use of an FTD by Part 61 sponsors.

"Lack of Part 61 Training Considerations, Excessive Hours of Operation"
§60.7(a)(b)(c) Part 60 and Appendices B & D

Discussion

1. In general this paragraph does not allow a Part 61 flight school to sponsor an FSD (more than likely an FTD). There are many schools that are of professional quality that choose to maintain the training flexibility that Part 61 allows. If an organization is capable of maintaining the quality control program that is eventually specified by this Part, and the local POI, FSDO or TPAA is satisfied that this is being met, then Part 61 schools should be allowed to sponsor an FSD.

   Specifically FSD usage allowed in Part 61 operations is as follows:
   Part 61.109 (i)(1) [Private 2.5 hours],
   Part 61.129 (i)(1)(i) [Commercial 50 hours]
   Parts 61.65 (d)(2) and (e)(2) [Instrument 20 hours]
   Part 61.159 (a)(3)(i) [ATP 25 hours]
   Parts 61.57 (c)(1)(i, ii, iii) [Currency for 6 Approaches, Holding, Course tracking]
   Part 61.57 (d)(1)(ii) [IFR Recurrency]

2. The minimum 600 hour requirement for each aircraft type or set is burdensome and does not necessarily reflect the usage patterns for FTD's, particularly ones that will be "convertible." The "Section-by-Section" ("Preamble") to this NPRM states that sponsor interest is shown, and cost is reduced to the NSPM by allowing only 600 hour FSD's to maintain qualification.

3. It is also unclear as to whether or not any sponsor (with or without a 119, 141, or 142 certificate) could use the FSD for Part 61 training. Also see proposed Parts 60.7(c)(2), 60.23(f), and 60.27(a)(1).

Proposed Changes

1. Allow the qualification and use of an FTD by Part 61 sponsors.

2. (a) Significantly reduce or do away with minimum hours. If minimum hours are finalized in this Part, then allow the sum of all times used by multiple configurations to meet these hourly requirements to show sponsor interest.

   (b) Authorize and train designees for qualifying FSD's. Designees are used elsewhere throughout the aviation industry, and could be qualified by the NSPM in its training programs. This is a win win for NSPM and also the aviation industry as FAA / NSPM budgetary considerations have been a problem not only to the NSPM, but also to the industry as a whole.

3. Allow the use of FTD's and simulators by all operators under Part 61 operations.

"Inability to Maintain Contact With a Manufacturer"
§60.9(b)(3) Part 60 and Appendices B & D

Discussion

1. Since aircraft models and cockpits at level 2 and 3 do not have to be aircraft specific, there is no manufacturer or certificate holder to maintain a liaison with.

Proposed Change

1. Change wording to reflect this requirement only for the higher level FSD's.

"Minor Software and Improved Hardware Updates"
§60.11(d) and §60.23(d), (e)(1) Part 60 and Appendices B & D

Discussion

1. These paragraphs deal with software and hardware modifications to the FSD's. Given the nature of today's PC based software and hardware, the ability to make small software changes which do not affect either ground or flight performance and which improve the overall FSD experience should be allowed without the burdensome requirement to always receive NSPM approval. This creates extra work for all parties involved.

2. On the hardware issue, "replacing or modifying the host computer" (or a server in a networked environment) is not the large issue today as it was in the past. Each generation of computers and accessories is not only getting more powerful but less expensive. One would also, on average, suspect a higher rate of replacement at the FTD level (as compared to large carrier simulator programs) since many FTD's are

operated in environmental conditions, which when compared to that of simulators, are much less benign. This can be due to the physical or electrical environment at the average airport, or operator experience.

3. There is also some conflict with repairs in 60.25(b) in that older PC based computers (1 to 1 ½ years not being untypical time periods) will not have needed parts available at any cost. Replacing the necessary computer or parts with improved hardware should not be held up pending NSPM approval. This will surely cause a backlog at NSPM and training in the field will be halted until NSPM approval is received.

Proposed Changes

1. Allow minor changes to software and updates of operating system (OS), which do not affect the flight or ground handling characteristics of the approved FSD. Require that the sponsor or FSD manufacturer for documentation purposes keep a log and software library of changes. With a Statement of Compliance and notification of the local POI or TPAA, and semi-annual qualifications, adequate barriers would be present to safeguard a proper flight environment.

2. Allow the replacement or modification of the current "host" computer with improved performance hardware. Use the same safeguards stated above.

3. For repairs, allow the replacement or modification of the current "host" computer with improved performance hardware. Use the same safeguards stated above.

"No FTD evaluations for Part 61"
§60.11(e) QPS in Appendices B & D

Discussion

1. Paragraph (e) does not mention Part 61 General Aviation schools. See discussion above in comments dealing with §60.7.

Proposed Change

1. Allow the qualification and use of an FTD by Part 61 sponsors.

"Obtaining Minor Flight Data Updates"
§60.13(g)(4), (j) QPS and Information in Appendices B & D

Discussion

1. Even though alternative source data can now be used for lower level FTD's, requiring data to meet the level of sophistication required by the FAA's Aircraft Certification Service is again a big program requirement. If a manufacturer opts to use real data for smaller aircraft instead of alternative source data this again will raise costs, which need to be passed on to the smaller operator.

2. To save the NSP staff and FTD manufacturer unnecessary paperwork, if only a minor data update is needed, then it probably is not helpful to review a flight test with the NSPM.

Proposed Changes

1. We don't know what the best answer for this problem is and would be happy to discuss this issue further with the NSPM.

2. Add wording to read that "Unless only minor updates to data are needed…"

"24 Hr advance Notice for Special Equipment"
§60.14(c) and **§**60.19(e) Information in Appendices B & D

Discussion

1. This is again a requirement for higher level simulators that would probably have special equipment and maintenance personnel available in the simulator facility.

Proposed Change

1. If special equipment is absolutely needed by NSPM, give at least 7 days notice in order to get special personnel and equipment in place.

"Apparent Typo"
§60.15(b.5) Part 60 in Appendices B & D

Discussion

1. Paragraph (c) appears to be missing from the first Part 60 in the appendices only section.

"Qualification of Sponsor Pilot"
§60.15(b)(3) Part 60 and Appendices B & D

Discussion

1. The referenced paragraph states that a pilot must meet requirements of paragraph **§**60.15 (c). It appears that (c) does not cover pilot qualifications but deals with FSD evaluations.

2. Also see **§**60.33 below

Proposed Change

1. Improve wording to clarify intent of paragraph. Is it the statement or pilot, which must meet requirements of paragraph (c)?

"General Aviation Part 61 Issues"

§60.17(f) Note. Information in Appendices B & D

Discussion

1. Paragraph (f) does not mention Part 61 General Aviation schools. See discussion above in comments dealing with §60.7.

Proposed Change

1. Allow the qualification and use of an FTD by Part 61 sponsors.

"Daily Preflight"
§60.19d(4), d(4)(d), QPS in Appendices B & D

Discussion

1. In the case of convertible FSD's, it is probably not necessary to preflight all the aircraft that are qualified in the FSD. A general functional check of one aircraft should be sufficient.
2. Same comment for helicopters.
3. If FMS data base date is not an issue in the training program, allow sponsor to decrease cost by keeping an older one installed.

Proposed Change

1. Change language to read " … and at least one simulated airplane, systems…"
2. Change language to read " … and at least one simulated helicopter, systems…"
3. Change language to read "If required, check Flight…"

"Automatic Testing Resulting in Higher G.A. Costs"
§60.19(f)(2) Information in Appendices B & D

Discussion

1. This paragraph allows the FTD recurrent evaluator to require an automatic test of the FTD. This is fine if the FTD can do an automatic test but does not allow for those lower level devices, which would need to be priced several times higher, if automatic tests were required.

   The higher costs associated with this requirement would price FTD's out of the General Aviation flight school markets. A resulting loss of General Aviation flight safety would result.

Proposed Change

1. Only allow evaluator to require an automatic test if an FSD has that capability.

"Discrepancy for Time to Repair"

§60.25(b) Part 60 and Appendices B & D

Discussion

1. Part 60 allows 7 days to repair or replace missing, malfunctioning or inoperative components. Appendices B & D allow up to 30 days. Is the Part 60, 7 day requirement a typographical error? If not, this time period might work well for those sponsors who have full-time on-site technicians, but would be burdensome for smaller flight schools operating Level 2 or 3 FTD's.

Proposed Change

1. Change Part 60 to read 30 days in order to make the time period more realistic and to match the other appendices.

"Automatic Loss of Qualification Due to Other Training and Moving FSD"
§60.27(a)(1), (a)(3), (b)(c) Part 60 and Appendices B & D

Discussion

1. (a)(1) Automatic loss of qualification is severe if an FSD is not used in an approved training program. (Also see above comments in §60.7 on Part 61 training) If someone wanted to come in and do Part 61 training, fly approaches solely for personal practice or any training for insurance purposes, the sponsor would now have an unqualified FSD.

   Though this is obviously not the intent, the language does not allow for anyone else's approved training program either.

   Also, is this a paragraph about training programs or official paperwork? §60.9(b)(4) deals with the "Statement of Qualification" issued by the NSPM.

   Getting it requalified or getting the NSPM or TPAA §60.27(b)(2) to advise that no evaluation is necessary, could cause an extreme workload every time a "non-student" got in the FSD.

2. (a)(3) It is not necessary to disqualify an FSD (particularly the FTD's) if they are moved. Lower level FTD's can be moved without affecting their capabilities.

Proposed Changes

1. Change language to reflect intent of NSPM concerning "Statement of Qualification.

   Allow training other than with a sponsor's FAA-approved training program.

2. Allow FSD's, particularly FTD's, to be moved if it does not interfere with the capabilities of the machine

"Sponsor Pilot (non-engineer) Loss of Flight Certificates"

§60.33(b) Part 60 and Appendices B & D

Discussion

1. The sponsor pilot has extensive requirements that are required of him by §60.15 (b)(3), (d), (e), and in particular (b)(5) for Part 60 and Appendices B & D. The penalties imposed by §60.33(b), particularly the loss of possibly all flight certificates, is very large for someone that typically does not have the engineering and flight test data information available to them required by §60.15.

Proposed Change

1. Delete the requirement in §60.15(e) which links (b)(3) and (b)(5).

End of Comments Applicable to Part 60 and Appendices B & D

Comments Applicable to Attachments, Appendices B & D

"Apparent Typo"
General (b)(c), page 60383

No section break

"Attitude Indicator Calculations"
General 3(d) Additional details, page 60384

Discussion

1. The requirement to check output signal to attitude indicator assumes a "round dial" gauge and does not allow for a glass cockpit Pilot Display or a CRT or LCD emulation of an attitude indicator.

Proposed Change

1. Also allow for a software driven and/or hardware combination to acquire this data.

"Motion System Not Distracting"
General 6(a), pages 60386 and 60489

Discussion

1. Clarification of Additional details is needed. The requirement that an installed, but not required, motion system not be distracting has worked well as a standard. Language could be interpreted as requiring Level A performance.

Proposed Change

1. Since this is a simulator standard appearing in the FTS section, change wording to read "…operation may not be distracting. As an alternative, the motion system standards set out in QPS FAA-S-120-40C for at least Level A simulators would also be acceptable. "

"Minimum Standard for Pixel Size"
General 7(a)(6), pages 60386 and 60489

Discussion

1. Restate requirement to better show that for enhanced visual clarity, 5 arc-minutes is the maximum pixel size allowed.

Proposed Change

1. Change paragraph to read "Maximum pixel size of 5 arc-min. is the minimum acceptable for both..."

"Automated Testing of Objective Tests"
QPS (a)(1), (a)(5)(c), pages 60387 and 60490

Discussion

1. This requirement is unrealistic as it is identical to simulator requirements. To expect automated testing at the lower level FTD's (2,3,5 and possibly 6) will be

prohibitively expensive, and has the potential to double or triple the price of the FTD. This will put it out of the economic capacity for many training organizations, thereby negating the benefits of flight simulation.

2. Requiring total dependence on automated recording devices such as a multi-channel recorder is overkill in many cases where, for example, a handheld stopwatch or manually read spring gauge could be used.

3. Para (5) the level of performance required here is actually higher for FTD's as compared to Level D simulators which only require "performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation." (pg 60330)

4. A similar argument could be applied to paras (b) and (c) also. Is the objective of a lower level simulator to fly at the extremes of aircraft performance as a manufacturer's test pilot would be interested in doing for aircraft certification, or training pilots for common every day situations. By requiring a Level 3 (and a Level 6 which would have to be upgraded if it was downgraded from a simulator) to perform at performance levels at the edge of the envelope is unrealistic and cost prohibitive.

To further complicate matters, a Level 3 FTD does not have to emulate a specific airplane but per 2 (a) pg. 60383 only must be representative of a single set of airplanes.

Proposed Changes

1. Allow manual testing of parameters if they are capable of being measured by this means.

2. Allow manual reading of measuring devices.

3. and 4. Since training is the desired objective, allow FTD's, particularly levels 2, 3, and 5 to operate at normal weights, CG's and normal envelope. Perhaps the normal envelope could be quantified as the middle 30% of a representative of a single set of airplanes.

"Motion and Visual System Requirements"
3d Pages 60384, 60487 and 7a Additional Details pages 60386, 60489

Discussion

1. The motion and visual requirements contained in the Standards and Additional details columns relating to "…if credits are sought" should be clarified.

2. In addition, an accelerometer would not be needed if the "motion not distracting" is used, as it is currently, as the appropriate standard. (Also see below "Level A Motion Parameters" 3a, page 60345)

Proposed Change

1. Change wording to show that visual and motion systems must either meet the appropriate standards if motion or visual is required and needed for specific credits, or if the credits are not being sought, change wording so that the required standard is that the visual or motion system should not be distracting.

2. Change paragraph to indicate accelerometer only required if Level A motion was being used as an alternative standard.

"FTD Model Engine requirements"
(a)(10) page 60387 (Appendix B only)

Discussion

1. Again simulator parameters are being applied to lower level devices. Obviously powerplant parameters have to be close to those of an actual aircraft to make the aerodynamic modeling perform well. The requirement to match a specific engine is not necessary. All we should be concerned about is how the airframe and engine perform according to the Objective and Subjective tests.

   Also, we again run into the representative of a single set of airplanes problem.

Proposed Change

1. At the lower levels, either drop the engine modeling requirement completely or just require that the engine modeling be sufficient to operate the aircraft correctly with respect to the Objective and Subjective tests.

"Level A Motion Parameters"
3a, page 60345

Discussion

1. The parameters for angular excursions appear to be quite large equaling a total of 80 degrees for Level A and B simulators. It is also probably true that as latency for modern simulators goes down, the amount of excursion required would go down also.

Proposed Change

1. Change total excursion to +/- 20 degrees.

"Rudder Response"
c(4)(b) Rudder Response Tolerance, page 60391

Discussion

1. Roll response is a possible outcome in the test details, but is not allowed for in tolerances.

Proposed Change

1. Include a defined Roll Rate with a tolerance of +/- 5 degrees/sec

"Apparent Typos"
4. Pages 60391 60392

1. "simulators" is used numerous times in FTD appendix, probably just a cut and paste error

"Simulator Control Dynamics"
4. Pages 60391 and 60495

Discussion

1. Simulator language is being used to describe FTD operation. Is this appropriate at the FTD level or is it overkill for Levels 2, 3 and 5?

Again, Level 3 is only required to be representative of a single set of airplanes.

Proposed Change

1. Change values required by this information section and make them more in tune with FTD requirements.

"Time Period Too Short for Ground Acceleration Tests"
Alternative Source Data 2(a)
Pages 60394, 60398, and 60406, 65524

Discussion

1. Many aircraft such as the C-172, Baron, and Arrow reach liftoff speed in 15 seconds.

Proposed Change

1. Change lower limit to read 12 seconds in order to allow tolerances beyond demonstrated 15 seconds in the above-mentioned aircraft.

"Too Fast for Ground Deceleration Tests"
Alternative Source Data 2(c)
Pages 60394, 60398, 60406, and 65524

Discussion

1. Deceleration rates are measured from speeds where the aircraft can fly. In this situation (depending on aerodynamic model) the aircraft must be held on ground thereby giving inaccurate results.

Proposed Change

1. Lower airspeeds in test or use some percentage of Vr. This will also require changing the timing.

"Clarification of Longitudinal Qualities"
Alternative Source Data 3(b)
Pages 60394, 60399, 60407, and 65525

Discussion

1. Many aircraft have no change in control forces when gear, flap or power changes are made within a constant airspeed, trimmed situation.

Proposed Change

1. Where the acceptable range does not pass through 0 (zero) lbs of force, change force requirements to start at 0 (zero) lbs of force and go up to maximum specified.

"Rudder Response Test"
Alternative Source Data c(4)(b)
Pages 60395, 60400, 60408, and 65526

Discussion

1. As stated in Objective Test C(4)(b), a roll response is acceptable. (Also see "Rudder Response" above)

Proposed Change

1. As a possible outcome, include a defined Roll Rate with a tolerance of +/- 5 degrees/sec.

"Apparent Typo"
Page 60398 2a.

Discussion

1. Acceleration time of 230 seconds is probably too long.

"Large Breakout Forces Multi-Recip"
Alternative Source Data
Figure 4 and 10, pages 60401 and 60409

Discussion

1. Graphs shows an extremely rapid rise in force required to move column.

Proposed Change

1. Recommend expanding graph to 0 lbs as in Figure 3, page 60396 and Figure 7 page 60404.

"Source Data Definition"
Pages 60417 and 60499

Discussion

1. Definition does not allow for possibility of some data being acquired manually.

Proposed Change

1. Change wording to state "...test parameters manually, electrically or electronically recorded..."

End of Comments Applicable to Attachments, Appendices B & D