APPENDIX F TO PART 60—DEFINITIONS AND ABBREVIATIONS FOR FLIGHT SIMULATION TRAINING DEVICES

BEGIN INFORMATION

1. The definitions presented below in *Italic type face* are repeated from the regulatory definitions found in part 1 or part 60, as indicated. In the event that a discrepancy exists between a definition found here, and one found in part 1 or part 60, the part 1 or part 60 definition prevails.

END INFORMATION

BEGIN QPS REQUIREMENTS

2. DEFINITIONS.

1st Segment—is that portion of the takeoff profile from liftoff to gear retraction.

2nd Segment—is that portion of the takeoff profile from after gear retraction to initial flap/slat retraction.

3rd Segment—is that portion of the takeoff profile after flap/slat retraction is complete.

Aircraft data package—is a combination of the various types of data used to design, program, manufacture, modify, and test the FSTD.

Airspeed—is calibrated airspeed unless otherwise specified and is expressed in terms of nautical miles per hour (knots).

Altitude—is pressure altitude (meters or feet) unless specified otherwise.

Angle of attack—is the angle between the airplane longitudinal axis and the relative wind vector projected onto the airplane plane of symmetry.

Automatic Testing—is FSTD testing wherein all stimuli are under computer control.

Bank—is the airplane attitude with respect to or around the longitudinal axis, or roll angle (degrees).

Breakout—is the force required at the pilot's primary controls to achieve initial movement of the control position.

Certificate holder—A person issued a certificate under parts 119, 141, or 142 of this chapter or a person holding an approved course of training for flight engineers in accordance with part 63 of this chapter. (Part 60)

Closed Loop Testing—is a test method for which the input stimuli are generated by controllers, which drive the FSTD to follow a pre-defined target response.

Computer Controlled Airplane—is an airplane where all pilot inputs to the control surfaces are transferred and augmented by computers.

Control Sweep—is movement of the appropriate pilot controller from neutral to an extreme limit in one direction (Forward, Aft, Right, or Left), a continuous movement back through neutral to the opposite extreme position, and then a return to the neutral position.

Convertible FSTD—is an FSTD in which hardware and software can be changed so that the FSTD becomes a replica of a different model, usually of the same type aircraft. The same FSTD platform, cockpit shell, motion system, visual system, computers, and necessary peripheral equipment can thus be used in more than one simulation.

Critical Engine Parameter—is the parameter, which is the most accurate measure of propulsive force.

Deadband—is the amount of movement of the input for a system for which there is no reaction in the output or state of the system observed.

Distance—is the length of space between two points and is expressed in terms of nautical miles unless specified otherwise.

Discrepancy—as used in this part, means an aspect of the FSTD that is not correct with respect to the aircraft being simulated. This includes missing, malfunctioning, and/or inoperative components that are required to be present and operate correctly for training, evaluation, and experience functions to be creditable. It also includes errors in the documentation used to support the FSTD (*e.g.*, errors in, or information missing from, the MQTG, required statements from appropriately qualified personnel).

Downgrade—is a permanent change in the qualification level of an FSTD to a lower level.

Driven—is a test method where the input stimulus or variable is positioned by automatic means, generally a computer input.

Electronic Copy of the MQTG—an electronic copy of the MQTG provided by an electronic scan presented in a Portable Document File (PDF), or similar format, acceptable to the NSPM.

Electronic Master Qualification Test Guide—is an electronic version of the MQTG (eMQTG), where all objective data obtained from airplane testing, or another approved source, together with correlating objective test results obtained from the performance of the FSTD and a description of the equipment necessary to perform the evaluation for the initial and the continuing qualification evaluations is stored, archived, or presented in either reformatted or digitized electronic format.

Engine—as used in this part, means the appliance or structure that supplies propulsive force for movement of the aircraft: *i.e.,* the turbine engine for turbine powered aircraft; the turbine engine and propeller assembly for turbo-propeller powered aircraft; and the reciprocating engine and propeller assembly for reciprocating engine powered aircraft. For purposes of this part, engine failure is

the failure of either the engine, or propeller assembly, to provide thrust higher than idle power thrust due to a failure of either the engine or the propeller assembly.

Evaluation—With respect to an individual, the checking, testing, or review associated with flight crewmember qualification, training, and certification under parts 61, 63, 121, or 135 of this chapter. With respect to an FSTD, the qualification activities (*e.g.*, the objective and subjective tests, the inspections, or the continuing qualification evaluations) associated with the requirements of this part. (Part 60)

Fictional Airport—is a visual model of an airport that is a collection of non-''real world'' terrain, instrument approach procedures, navigation aids, maps, and visual modeling detail sufficient to enable completion of an Airline Transport Pilot Certificate or Type Rating.

Flight experience—Flight experience means recency of flight experience for landing credit purposes. (Part 60)

Flight simulation training device (FSTD) means a full flight simulator (FFS) or a flight training device (FTD). (Part 1)

Flight test data—(a subset of Objective data) Aircraft data collected by the aircraft manufacturer (or other supplier of data that are acceptable to the NSPM) during an aircraft flight test program. (Part 60)

Flight training device (FTD) means a replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft cockpit replica. It includes the equipment and computer programs necessary to represent aircraft (or set of aircraft) operations in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standard (QPS) for a specific FTD qualification level. (Part 1)

Free Response—is the response of the FSTD after completion of a control input or disturbance.

Frozen—is a test condition where one or more variables are held constant with time.

FSTD Approval—is the extent to which an FSTD may be used by a certificate holder as authorized by the FAA. It takes into account aircraft to FSTD differences and the training ability of the organization.

FSTD Directive—A document issued by the FAA to an FSTD sponsor, requiring a modification to the FSTD due to a recognized safety-of-flight issue and amending the qualification basis for the FSTD. (Part 60)

FSTD Latency—is the additional time beyond that of the response time of the aircraft due to the response of the FSTD.

FSTD Performance—The overall performance of the FSTD includes aircraft performance (*e.g.*, thrust/drag relationships, climb, range) as well as flight and ground handling. (Part 60)

Full flight simulator (FFS) means a replica of a specific type; or make, model, and series aircraft cockpit. It includes the assemblage of equipment and computer programs necessary to represent aircraft operations in ground and flight conditions, a visual system providing an out-of-the-cockpit view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and has the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standards (QPS) for a specific FFS qualification level. (Part 1)

Generic Airport—is a Class III visual model that combines correct navigation aids for a real world airport with a visual model which does not correctly depict that same airport.

Grandfathering—as used in this part, means the practice of assigning a qualification basis for an FSTD, based on the period of time during which a published set of standards governed the requirements for the initial and continuing qualification of FSTDs. Each FSTD manufactured during this specified period of time is ''grandfathered,'' or is ''held to the standards'' that are, or were, in effect during that time period. The grandfathered standards remain applicable to each FSTD manufactured during the stated time period, regardless of any subsequent modification to those standards and regardless of the sponsor, as long as the FSTD remains continuously qualified or is maintained in a non-qualified status in accordance with the specific requirements and time periods set out in this part. Each FSTD manufactured prior to the beginning date (or manufactured after the ending date) of a designated grandfather time period would have as its qualification basis, the standards in effect during the time period prior to, or subsequent to, the designated period.

Gross Weight—For objective test purposes:

Basic Operating Weight—(BOW) is the empty weight of the aircraft plus the weight of the following: normal oil quantity; lavatory servicing fluid; potable water; required crewmembers and their baggage; and emergency equipment.

Near Maximum Gross Weight—is a weight chosen by the sponsor or data provider that is not less than the basic operating weight (BOW) of the airplane being simulated plus 80% of the difference between the maximum certificated gross weight (either takeoff weight or landing weight, as appropriate for the test) and the BOW.

Light Gross Weight—is a weight chosen by the sponsor or data provider that is not more than 120% of the BOW of the airplane being simulated or as limited by the minimum practical operating weight of the test airplane.

Medium Gross Weight—is a weight chosen by the sponsor or data provider that is approximately ±10% of the average of the numerical values of the BOW and the maximum certificated gross weight.

Ground Effect—is the change in aerodynamic characteristics due to modification of the airflow past the aircraft caused by the proximity of the Earth's surface to the airplane.

Hands Off—is a test maneuver conducted without pilot control inputs.

Hands On—is a test maneuver conducted with pilot control inputs as required.

Heave—is FSTD movement with respect to or along the vertical axis.

Height—is the height above ground level (or AGL) expressed in meters or feet.

''*In Use*'' *Runway*—as used in this part, means the runway that is ''active,'' (is currently ''selected'' and able to be used for takeoffs and landings) and has the surface lighting and markings required by this part.

Integrated Testing—is testing of the FSTD such that all aircraft system models are active and contribute appropriately to the results where none of the models used are substituted with models or other algorithms intended for testing only.

Irreversible Control System—is a control system in which movement of the control surface will not backdrive the pilot's control in the cockpit.

Locked—is a test condition where one or more variables are held constant with time.

Manual Testing—is FSTD testing conducted without computer inputs except for initial setup and all modules of the simulation are active.

Master Qualification Test Guide (MQTG)—The FAA-approved Qualification Test Guide with the addition of the FAA-witnessed test results, applicable to each individual FSTD. (Part 60)

Medium—is the normal operational weight for a given flight segment.

National Simulator Program Manager (NSPM)—The FAA manager responsible for the overall administration and direction of the National Simulator Program (NSP), or a person approved by that FAA manager. (Part 60)

Nominal—is the normal operating configuration, atmospheric conditions, and flight parameters for the flight segment specified.

Non-Normal Control—is a term used in reference to Computer Controlled Airplanes and is the state where one or more of the intended control, augmentation, or protection functions are not fully working. NOTE: Specific terms such as ALTERNATE, DIRECT, SECONDARY, or BACKUP may be used to define an actual level of degradation.

Normal Control—is a term used in reference to Computer Controlled Airplanes and is the state where the intended control, augmentation, and protection functions are fully working.

Objective data—Quantitative data, acceptable to the NSPM, used to evaluate the FSTD.

Objective test—A quantitative measurement and evaluation of FSTD performance. (Part 60)

Pitch—is the airplane attitude with respect to, or around, the lateral axis expressed in degrees.

Power Lever Angle (PLA)—is the angle of the pilot's primary engine control lever(s) in the cockpit. This may also be referred to as THROTTLE or POWER LEVER.

Predicted data—Estimations or extrapolations of either existing flight test data or data from other simulation models using engineering analyses, engineering simulations, design data, and/or wind tunnel data. (Part 60)

Protection Functions—are systems functions designed to protect an airplane from exceeding its flight maneuver limitations.

Pulse Input—is a step input to a control followed by an immediate return to the initial position.

Qualification level—The categorization of an FSTD established by the NSPM, based on the FSTDs demonstrated technical and operational capabilities as set out in this part. (Part 60)

Qualification Performance Standard (QPS)—The collection of procedures and criteria published by the FAA to be used when conducting objective tests and subjective tests, including general FSTD requirements, for establishing FSTD qualification levels. The QPS are published in the appendices to this part, as follows: Appendix A, for Airplane Simulators; Appendix B, for Airplane Flight Training Devices; Appendix C, for Helicopter Simulators; Appendix D, for Helicopter Flight Training Devices; Appendix E, for Quality Management Systems for Flight Simulation Training Devices; and Appendix F, for Definitions and Abbreviations for Flight Simulation Training Devices. (Part 60)

Qualification Test Guide (QTG)—The primary reference document used for evaluating an aircraft FSTD. It contains test results, statements of compliance and capability, the configuration of the aircraft simulated, and other information for the evaluator to assess the FSTD against the applicable regulatory criteria. (Part 60)

Quality Management System (QMS)—the aviation standard for flight simulation quality-systems that can be used for external quality-assurance purposes. It is a collection of generic and independent requirements unrelated to any specific industry or economic sector. It is not designed to enforce uniformity of quality systems, but to identify the processes needed, determine the sequence and interaction of these processes,

determine criteria and methods required to ensure the effective operation and control of these processes, ensure the availability of information necessary to support the operation and monitoring of these processes, measure, monitor and analyze these processes, and implement the actions necessary to achieve planned results. The design and implementation of a specific quality management system is influenced by the varying needs of the individual sponsor, their particular objectives, the flight simulation products and services supplied, and the processes and specific practices employed.

Real-World Airport—as used in this part in reference to airport visual models, means a computer generated visual depiction of an airport that exists in reality.

Representative—When used as an adjective in this part, means typical, demonstrative, or characteristic of, or with respect to, the feature being described. For example:

1. ''Representative sampling of tests'' means a sub-set of the complete set of all tests such that the sample includes one or more of the tests in each of the major categories, the results of which would provide the evaluator a typical, or overall, understanding of the performance and/or handling characteristics of the FSTD.

2. ''Representative airport model'' (or ''ground/airborne traffic,'' ''lights,'' ''runway/taxiway markings,'' ''terrain,'' ''weather phenomena'') means a computer generated visual depiction of a real-world or fictional airport (or traffic, lights, markings, terrain, weather phenomena.) that is typical or characteristic of an airport (or traffic, lights, markings, terrain, weather phenomena) regularly used or seen by the sponsor, or the sponsor's client using the FSTD, in normal operations.

Reversible Control System—is a control system in which movement of the control surface will backdrive the pilot's control in the cockpit.

Roll—is the airplane attitude with respect to, or around, the longitudinal axis expressed in degrees.

Set of aircraft—Aircraft that share similar handling and operating characteristics and similar operating envelopes and have the same number and type of engines or power plants. (Part 60)

Sideslip Angle—is the angle between the relative wind vector and the airplane plane of symmetry. (note: this definition replaces the current definition of ''sideslip.'')

Simulation Quality Management System (SQMS)—consists of the required and voluntary elements of a quality management system for FSTD continuing qualification.

Snapshot—is a presentation of one or more variables at a given instant of time.

Special Evaluation—is an evaluation of the FSTD for purposes other than initial, upgrade, or continuing qualification. Circumstances that might indicate the need for a special evaluation would include, but not necessarily be limited to, the following: after the FSTD is moved and reinstalled at another location; after an update to FSTD software or hardware that might affect performance or flying qualities; after a substantial update to FSTD avionics packages (e.g., autopilot, flight management systems); after substantial modifications to FSTD configuration; after a complaint is received from a credible source indicating that the FSTD does not perform or handle like the aircraft it simulates.

Sponsor—A certificate holder who seeks or maintains FSTD qualification and is responsible for the prescribed actions as set out in this part and the QPS for the appropriate FSTD and qualification level. (Part 60)

Statement of Compliance and Capability (SOC)—is a declaration that specific requirements have been met. It must declare that compliance with the requirement is achieved and explain how the requirement is met (e.g., gear modeling approach, coefficient of friction sources). It must also describe the capability of the FSTD to meet the requirement (e.g., computer speed, visual system refresh rate). In doing this, the statement must provide references to needed sources of information for showing compliance, rationale to explain how the referenced material is used, mathematical equations and parameter values used, and conclusions reached.

Step Input—is an abrupt control input held at a constant value.

Subjective test—A qualitative assessment of the performance and operation of the FSTD. (Part 60)

Surge—is FSTD movement with respect to or along the longitudinal axis.

Sway—is FSTD movement with respect to or along the lateral axis.

Time History—is a presentation of the change of a variable with respect to time.

Training Program Approval Authority (TPAA)—A person authorized by the Administrator to approve the aircraft flight training program in which the FSTD will be used. (Part 60)

Training Restriction—is a temporary condition where, due to a Missing, Malfunctioning, or Inoperative (MMI) Component condition, the FSTD may continue to be used at the qualification level indicated on its SOQ but restricted from accomplishing the task for which the correct function of the MMI component is required.

Transport Delay or ''Throughput''—is the total FSTD system processing time required for an input signal from a pilot primary flight control until motion system, visual system, or instrument response. It is the overall time delay incurred from signal input until output response. It does not include the characteristic delay of the airplane simulated.

Upgrade—The improvement or enhancement of an FSTD for the purpose of achieving a higher qualification level. (Part 60)

Validation Data—Objective data used to determine if the FSTD performance is within the tolerances prescribed in the QPS.

Validation Test—An objective test whereby FSTD parameters are compared to the relevant validation data to ensure that the FSTD performance is within the tolerances prescribed in the QPS.

Visual Data Base—is a display that may include one or more visual models.

Visual Model—is a collection of one or more visual scenes of an airport or portion(s) of an airport.

Visual System Response Time—is the interval from a control input to the completion of the visual display scan of the first video field containing the resulting different information.

Yaw—is airplane attitude with respect to, or around, the vertical axis expressed in degrees.

3. ABBREVIATIONS.

AFM Approved Flight Manual.
AlL Above Ground Level (meters or feet).
AOA Angle of Attack (degrees).
APD Aircrew Program Designee.
CCA Computer Controlled Airplane.
cd/m^2 candela/$meter^2$, 3.4263 candela/m^2 = 1 ft-Lambert.
CFR Code of Federal Regulations.
cm(s) centimeter, centimeters.
daN decaNewtons, one (1) decaNewton = 2.27 pounds.
deg(s) degree, degrees.
DOF Degrees-of-freedom.
eMQTG Electronic Master Qualification Test Guide.
EPR Engine Pressure Ratio.
FAA Federal Aviation Administration (U.S.).
fpm feet per minute.
ft foot/feet, 1 foot = 0.304801 meters.
ft-Lambert foot-Lambert, 1 ft-Lambert = 3.4263 candela/m^2.
g Acceleration due to Gravity (meters or feet/sec^2); 1 g = 9.81 m/sec^2 or 32.2 feet/sec^2.
G/S Glideslope.
IATA International Airline Transport Association.
ICAO International Civil Aviation Organization.
IGE In ground effect.
ILS Instrument Landing System.
IQTG International Qualification Test Guide.
km Kilometers 1 km = 0.62137 Statute Miles.
kPa KiloPascal (Kilo Newton/Meters2). 1 psi = 6.89476 kPa.
kts Knots calibrated airspeed unless otherwise specified, 1 knot = 0.5148 m/sec or 1.689 ft/sec.
lb(s) pound(s), one (1) pound = 0.44 decaNewton.
LDP Landing decision point.
M,m Meters, 1 Meter = 3.28083 feet.
Min(s) Minute, minutes.
MLG Main Landing Gear.
Mpa MegaPascals (1 psi = 6894.76 pascals).
ms millisecond(s).
N NORMAL CONTROL Used in reference to Computer Controlled Airplanes.
nm Nautical Mile(s) 1 Nautical Mile = 6,080 feet.
NN NON-NORMAL CONTROL Used in reference to Computer Controlled Airplanes.
N1 Low Pressure Rotor revolutions per minute, expressed in percent of maximum.
N2 High Pressure Rotor revolutions per minute, expressed in percent of maximum.
N3 High Pressure Rotor revolutions per minute, expressed in percent of maximum.
NWA Nosewheel Angle (degrees).
OGE Out of ground effect.
PAPI Precision Approach Path Indicator System.
Pf Impact or Feel Pressure, often expressed as ''q.''
PLA Power Lever Angle.
PLF Power for Level Flight.
psi pounds per square inch.
QPS Qualification Performance Standard.
RAE Royal Aerospace Establishment.
R/C Rate of Climb (meters/sec or feet/min).
R/D Rate of Descent (meters/sec or feet/min).
REIL Runway End Identifier Lights.
RVR Runway Visual Range (meters or feet).
s second(s).
sec(s) second, seconds.
sm Statute Mile(s) 1 Statute Mile = 5,280 feet.
SOC Statement of Compliance and Capability.
Tf Total time of the flare maneuver duration.
Ti Total time from initial throttle movement until a 10% response of a critical engine parameter.
TIR Type Inspection Report.
T/O Takeoff.
Tt Total time from Ti to a 90% increase or decrease in the power level specified.
VASI Visual Approach Slope Indicator System.
VGS Visual Ground Segment.
V_1 Decision speed.
V_2 Takeoff safety speed.
Vmc Minimum Control Speed.
Vmca Minimum Control Speed in the air.
Vmcg Minimum Control Speed on the ground.
Vmcl Minimum Control Speed—Landing.
Vmu The speed at which the last main landing gear leaves the ground.
V_R Rotate Speed.
V_s Stall Speed or minimum speed in the stall.

WAT Weight, Altitude, Temperature.

END QPS REQUIREMENTS

PART 61—CERTIFICATION: PILOTS, FLIGHT INSTRUCTORS, AND GROUND INSTRUCTORS

SPECIAL FEDERAL AVIATION REGULATION NO. 73
SPECIAL FEDERAL AVIATION REGULATION NO. 93
SPECIAL FEDERAL AVIATION REGULATION NO. 100–1

Subpart A—General

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