

May 23, 2017

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Original Delivered by: Certified Mail Return Receipt Requested  
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John S. Duncan  
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Flight Standards Service  
FAA National Headquarters  
800 Independence Ave SW  
Washington, DC 20591

RE: Objective Standard for 14 CFR section [145.221](#) Reports

Dear Mr. Duncan:

It has come to the attention of the undersigned that the agency is finding it difficult to apply and enforce the requirements of 14 CFR section [145.221](#) in a consistent manner. The issue is created by the unpredictable application of the word “serious” in conjunction with the broad phrase “failure, malfunction or defect of an article” when auditing a repair station.

Article is defined in section [145.3\(b\)](#) to mean “an aircraft, airframe, aircraft engine, propeller, appliance, or component part.” Thus, the definition includes any item that is sent to a certificated repair station that needs maintenance, preventive maintenance or alteration. It also includes any item in the article sent for restoration or alteration action.

The fact is most articles sent for maintenance or alteration actions have “serious” issues; it is why they are being sent for restoration or alteration. Serious, previously-undetected defects caused by issues with design or production deficiencies, are relatively easy to recognize and report. On the other hand, the “serious” failures and malfunctions that are known, anticipated, recognized as correctable or have corrective action instituted are the bread and butter of the maintenance industry. It seems incongruous that the agency would need a service difficulty report on any and all items received for processing by a repair station that have known and correctable “serious” failures, malfunctions or defects.

To avoid over-reporting and clogging up the agency’s system for handling section [145.221](#) reports, and to ensure unknown, unanticipated and serious matters are reported, logic indicates that the agency require reports on conditions (failures, malfunctions or defects) that do not have corrective actions available from—

- (1) A design approval holder’s maintenance data (manuals or instructions for continued airworthiness, service bulletins and the like); or,
- (2) Other methods, techniques or practices acceptable to or approved by the agency; or,
- (3) An airworthiness directive.

RE: Objective Standard for 14 CFR section [145.221](#) Reports

The reasoning behind the logic is that if a corrective action is available, the seriousness of the failure, malfunction or defect has been eliminated—that is, it will be corrected by the maintenance or alteration action provided or contemplated (by methods, techniques or practices under section [43.13\(a\)](#)) or mandated (by the airworthiness directive).

This reasoning is supported by a review of the reporting requirements for owners and operators and design approval holders. Most require that enumerated events be reported with specific information, including “[o]ther pertinent information necessary for more complete identification, determination of seriousness, or corrective action” (emphasis added). The serious failures, malfunctions or defects that must be reported are those conditions where the aircraft’s ability to continue safe flight and landing is compromised. Furthermore, the information design approval holders and owner/operators must submit to the agency makes clear when a corrective action was or could be taken by a maintenance provider to address the serious failure, malfunction or defect.

To align the repair station requirements with the operational reports so serious failures, malfunction and defects which endanger the safe flight and landing of an aircraft can be identified, the undersigned offer the following process:

Articles received for maintenance, preventive maintenance or alteration by repair stations are evaluated; known and unknown or unusual discrepancies are noted during the preliminary and/or in-process and/or hidden damage and/or final inspections.<sup>1</sup> If an unknown or an unusual discrepancy was the cause of the article’s failure or malfunction, or the failure or malfunction was caused by an obvious design or production defect, it shall be further evaluated to determine if the condition would have required a specifically enumerated design approval holder or operator report.<sup>2</sup> If such a report would have been required, a section [145.221](#) report must be generated.

In most cases, whether or not the design approval holder or operator generates a report will not be known to the maintenance provider. Nevertheless, information from the proposed section [145.221](#) reports could and would be more closely aligned with those mandated submissions. Thus, the agency would have more comprehensive information to comb for precursors to serious conditions, design and production approval holders could be contacted in a timelier manner, and operators would become accustomed to providing more information to maintenance providers to enhance the safety system.

We request the agency find the method of compliance to section [145.221](#) as described above acceptable or provide an objective standard for its aviation safety inspectors to

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<sup>1</sup> See § [145.211](#)(c)(1)(ii), (iii) and (vii).

<sup>2</sup> The attached matrix aligns the various enumerated conditions that must be reported by operators and design approval holders. The matrix could be used by the repair station to make the evaluation suggested.

May 23, 2017  
John S. Duncan  
Page 3

RE: Objective Standard for 14 CFR section [145.221](#) Reports

apply when evaluating a part 145 certificate holder's compliance with that regulation. We look forward to your prompt response in resolving this long-standing issue.

Sincerely,

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May 23, 2017  
John S. Duncan  
Page 4

RE: Objective Standard for 14 CFR section [145.221](#) Reports

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Attachment: Operator and Design Approval Holder Failure, Malfunction and Defect Reporting Requirements

Operator and Design Approval Holder Failure, Malfunction and Defect Reporting Requirements (aka, Service Difficulty Reports or Mechanical Reliability Reports)

	<b>49 CFR § 830.5 Immediate notification.</b>	<b>§ 21.3 Reporting of failures, malfunctions, and defects.</b>	<b>§ 91.1415 CAMP: Mechanical reliability reports.</b>	<b>§ 121.703 Service difficulty reports.</b>	<b>§ 135.415 Service difficulty reports.</b>
(1)	(a)(4) In-flight fire;	(c)(1) Fires caused by a system or equipment failure, malfunction, or defect.	(a)(1) Fires during flight and whether the related fire-warning system functioned properly; (a)(2) Fires during flight not protected by related fire-warning system; (a)(3) False fire-warning during flight;	(a)(1) Fires during flight and whether the related fire-warning system functioned properly (a)(2) Fires during flight not protected by a related fire-warning system; (a)(3) False fire warning during flight;	(a)(1) Fires during flight and whether the related fire-warning system functioned properly; (a)(2) Fires during flight not protected by related fire-warning system; (3) False fire-warning during flight;
(2)		(c)(2) An engine exhaust system failure, malfunction, or defect which causes damage to the engine, adjacent aircraft structure, equipment, or components.	(a)(4) An exhaust system that causes damage during flight to the engine, adjacent structure, equipment, or components;	(a)(4) An engine exhaust system that causes damage during flight to the engine, adjacent structure, equipment, or components;	(a)(4) An exhaust system that causes damage during flight to the engine, adjacent structure, equipment, or components;
(3)		(c)(3) The accumulation or circulation of toxic or noxious gases in the crew compartment or passenger cabin.	(a)(5) An aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes in the crew compartment or passenger cabin during flight;	(a)(5) An aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes in the crew compartment or passenger cabin during flight;	(a)(5) An aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes in the crew compartment or passenger cabin during flight;
(4)	(a)(3) Failure of any internal turbine engine component that results in the escape of debris other than out the exhaust path; (a)(7)(iii) Sustained loss of the power or thrust produced by two or more engines	(c)(10) An engine failure.	(a)(6) Engine shutdown during flight because of flameout; (a)(7) Engine shutdown during flight when external damage to the engine or aircraft structure occurs; (a)(8) Engine shutdown during flight because of foreign object ingestion or icing; (a)(9) Shutdown of more than one engine during flight;	(a)(6) Engine shutdown during flight because of flameout; (a)(7) Engine shutdown during flight when external damage to the engine or airplane structure occurs; (a)(8) Engine shutdown during flight due to foreign object ingestion or icing; (a)(9) Engine shutdown during flight of more than one engine;	(a)(6) Engine shutdown during flight because of flameout; (a)(7) Engine shutdown during flight when external damage to the engine or aircraft structure occurs; (a)(8) Engine shutdown during flight due to foreign object ingestion or icing; (a)(9) Shutdown of more than one engine during flight;
(5)	(a)(8) Release of all or a portion of a propeller blade from an aircraft, excluding release caused solely by ground contact	(c)(4) A malfunction, failure, or defect of a propeller control system	(a)(10) A propeller feathering system or ability of the system to control overspeed during flight;	(a)(10) A propeller feathering system or ability of the system to control overspeed during flight;	(a)(10) A propeller feathering system or ability of the system to control overspeed during flight;
(6)	(a)(11) Damage to helicopter tail or main rotor blades, including ground damage, that requires major repair or replacement of the blade(s);				
(7)		(a)(5) A propeller or rotorcraft hub or blade structural failure.			
(8)		(a)(6) Flammable fluid leakage in areas where an ignition source normally exists.	(a)(11) A fuel or fuel-dumping system that affects fuel flow or causes hazardous leakage during flight;	(a)(11) A fuel or fuel-dumping system that affects fuel flow or causes hazardous leakage during flight;	(a)(11) A fuel or fuel-dumping system that affects fuel flow or causes hazardous leakage during flight;
(9)			(a)(12) An unwanted landing gear extension or retraction or opening or closing of landing gear doors during flight;	(a)(12) An unwanted landing gear extension or retraction, or an unwanted opening or closing of landing gear doors during flight;	(a)(12) An unwanted landing gear extension or retraction or opening or closing of landing gear doors during flight;

	<b>49 CFR § 830.5 Immediate notification.</b>	<b>§ 21.3 Reporting of failures, malfunctions, and defects.</b>	<b>§ 91.1415 CAMP: Mechanical reliability reports.</b>	<b>§ 121.703 Service difficulty reports.</b>	<b>§ 135.415 Service difficulty reports.</b>
(10)		(a)(7) A brake system failure caused by structural or material failure during operation.	(a)(13) Brake system components that result in loss of brake actuating force when the aircraft is in motion on the ground;	(a)(13) Brake system components that result in loss of brake actuating force when the airplane is in motion on the ground;	(a)(13) Brake system components that result in loss of brake actuating force when the aircraft is in motion on the ground;
(11)		(a)(8) A significant aircraft primary structural defect or failure caused by any autogenous condition (fatigue, understrength, corrosion, etc.).	(a)(14) Aircraft structure that requires major repair; (a)(15) Cracks, permanent deformation, or corrosion of aircraft structures, if more than the maximum acceptable to the manufacturer or the FAA;	(a)(14) Aircraft structure that requires major repair; (a)(15) Cracks, permanent deformation, or corrosion of aircraft structures, if more than the maximum acceptable to the manufacturer or the FAA;	(a)(14) Aircraft structure that requires major repair; (a)(15) Cracks, permanent deformation, or corrosion of aircraft structures, if more than the maximum acceptable to the manufacturer or the FAA;
(12)		(a)(9) Any abnormal vibration or buffeting caused by a structural or system malfunction, defect, or failure.			
(13)	(a)(7)(i) In-flight failure of electrical systems which requires the sustained use of an emergency bus powered by a back-up source such as a battery, auxiliary power unit, or air-driven generator to retain flight control or essential instruments; (a)(7)(ii) In-flight failure of hydraulic systems that results in sustained reliance on the sole remaining hydraulic or mechanical system for movement of flight control surfaces;				
(14)	(a)(1) Flight control system malfunction or failure;	(a)(11) Any structural or flight control system malfunction, defect, or failure which causes an interference with normal control of the aircraft for which derogates the flying qualities.	(a)(16) Aircraft components or systems that result in taking emergency actions during flight (except action to shut down an engine).	(a)(16) Aircraft components or systems that result in taking emergency actions during flight (except action to shut down an engine); and	(a)(16) Aircraft components or systems that result in taking emergency actions during flight (except action to shut down an engine).
(15)				(a)(17) Emergency evacuation systems or components including all exit doors, passenger emergency evacuation lighting systems, or evacuation equipment that are found defective, or that fail to perform the intended functions during an actual emergency or during training, testing, maintenance, demonstrations, or inadvertent deployments.	

	49 CFR § <a href="#">830.5</a> Immediate notification.	§ <a href="#">21.3</a> Reporting of failures, malfunctions, and defects.	§ <a href="#">91.1415</a> CAMP: Mechanical reliability reports.	§ <a href="#">121.703</a> Service difficulty reports.	§ <a href="#">135.415</a> Service difficulty reports.
(16)		(a)(12) A complete loss of more than one electrical power generating system or hydraulic power system during a given operation of the aircraft.			
(17)	(a)(9) A complete loss of information, excluding flickering, from more than 50 percent of an aircraft's cockpit displays known as: (i) Electronic Flight Instrument System (EFIS) displays; (ii) Engine Indication and Crew Alerting System (EICAS) displays; (iii) Electronic Centralized Aircraft Monitor (ECAM) displays; or (iv) Other displays of this type, which generally include a primary flight display (PFD), primary navigation display (PND), and other integrated displays; (a)(10) Airborne Collision and Avoidance System (ACAS) resolution advisories issued when an aircraft is being operated on an instrument flight rules flight plan and compliance with the advisory is necessary to avert a substantial risk of collision between two or more aircraft.	(a)(13) A failure or malfunction of more than one attitude, airspeed, or altitude instrument during a given operation of the aircraft.			