Designation: F 2584 – 06

Standard Practice for Maintenance and Development of Maintenance Manuals for Light Unmanned Aircraft System (UAS)[1]

This standard is issued under the fixed designation F 2584; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice provides guidelines for the qualifications to accomplish the various levels of maintenance on certificated light unmanned aircraft system (UAS). In addition, it provides the content and structure of maintenance manuals for aircraft, ground control station, and data links that are operated as a light unmanned aircraft system (UAS).

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

F 2241 Specification for Continued Airworthiness System for Powered Parachute Aircraft

F 2295 Practice for Continued Operational Safety Monitoring of a Light Sport Airplane

F 2395 Terminology for Unmanned Air Vehicle Systems

F 2411 Specification for Design and Performance of an Airborne Sense-and-Avoid System

F 2415 Practice for Continued Airworthiness System for Light Sport Gyroplane Aircraft

2.2 *CFR Standards:*[3]

14 CFR Part 21.190 Issue of a Special Airworthiness Certificate for a Light-Sport Category Aircraft

14 CFR Part 43 Maintenance, Preventive Maintenance, Rebuilding, and Alteration

14 CFR Part 65 Certification: Airmen Other Than Flight Crewmembers

3. Terminology

3.1 *Definitions:*

3.1.1 *A&P*—airframe and powerplant mechanic as defined by 14 CFR Part 65 in the U.S. or equivalent certification in other countries.

3.1.2 *annual condition inspection*—detailed inspection accomplished once a year on a light UAS in accordance with instructions provided in the manufacturer's maintenance manual supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.

3.1.3 *heavy maintenance*—any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities.

3.1.4 *light UAS repairman inspection*—U.S. FAA certificated repairman (light UAS), with an inspection rating as defined by 14 CFR Part 65, authorized to perform the annual condition inspection on light UAS aircraft, ground station, and the ground data terminal, or an equivalent rating issued by other civil aviation authorities.

3.1.4.1 *Discussion*—Experimental light UAS do not require the individuals performing maintenance to hold any FAA airman certificate in the U.S.

3.1.5 *light UAS repairman maintenance*—U.S. FAA certificated repairman (light UAS), with a maintenance rating as defined by 14 CFR Part 65, authorized to perform line maintenance on aircraft, ground control station, and ground data terminal, certificated as light UAS. Authorized to perform the annual condition/100-h inspection on a light UAS aircraft, ground control station, and ground data terminal, or an equivalent rating issued by other civil aviation authorities.

3.1.6 *light unmanned aircraft system*—light unmanned aircraft system designed in accordance with ASTM standards under the jurisdiction of Committee F38. The UAS includes the aircraft, the ground control station, and the ground data terminal. Examples include Specification F 2411, Terminology

[1] This practice is under the jurisdiction of ASTM Committee F38 on Unmanned Aircraft Systems and is the direct responsibility of Subcommittee F38.01 on Airworthiness.

Current edition approved July 15, 2006. Published July 2006.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

F 2395, and 14 CFR: Code of Federal Regulations Title 14 Aeronautics and Space, also know as the "FARs" or Federal Aviation Regulations.

3.1.7 *line maintenance*—any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and is specified in the manufacturer's maintenance manual.

3.1.8 *major repair, alteration, or maintenance*—any repair, alteration, or maintenance for which instructions to complete the task are excluded from the manufacturer's maintenance manual(s) supplied to the consumer are considered major.

3.1.9 *manufacturer*—any entity engaged in the production of a light UAS or component used on a light UAS.

3.1.10 *manufacturer's maintenance manual(s)*—manual provided by a light UAS manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer.

3.1.11 *minor repair, alteration, or maintenance*—any repair, alteration, or maintenance for which instructions are provided for in the manufacturer's maintenance manual(s) supplied to the consumer of the product are considered minor.

3.1.12 *overhaul*—maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product.

3.1.13 *overhaul facility*—facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.

3.1.14 *100-h inspection*—same as an *annual condition inspection*, except the interval of inspection is 100 h of operation instead of twelve calendar months and there must be at least one 100-h inspection each year. This inspection is utilized at 100-h intervals of flight when the light UAS is being used for commercial operations.

3.1.15 *repair facility*—facility specifically authorized by the aircraft or component manufacturer to repair the product originally produced by that manufacturer.

4. Significance and Use

4.1 The purpose of this practice is to provide guidance to owners, mechanics, airports, regulatory officials, and aircraft and component manufacturers who may accomplish maintenance, repairs, and alterations on a light unmanned aircraft system (UAS). In addition, this practice covers the format and content of maintenance manuals and instructions for the maintenance, repair, and alteration of light UAS. The light UAS can be operated as a commercial aircraft or as a sport aircraft. This practice states the requirements for the maintenance of light commercial UAS. These same requirements may be used for the sport light UAS with the provisions shown. The maintenance requirements are divided between the aircraft and the ground equipment. The aircraft contains the air data terminal and the ground station controls the nearby ground data terminal. Therefore, the data link is not listed as a separate component, but has elements in the aircraft and near the ground station that is called the ground data terminal.

5. Manufacturer's Maintenance Manual

NOTE 1—This practice provides the information needed to comply with the requirement of what the maintenance manual will contain.

NOTE 2—Manufacturers of light UAS for sale in the U.S. are required to provide a maintenance manual for each aircraft in accordance with 14 CFR Part 21.190. These manuals do not require any type of approval from the FAA or other government entity; however, the regulations do require the manual to be developed in accordance with industry consensus standards.

5.1 *Format*:

5.1.1 *Aircraft*—The maintenance manual for the aircraft shall have the following sections:

5.1.1.1 *General*—Listings of general specifications, capacities, and instructions on ground handling, servicing, and lubrication, such as:

(1) Equipment list,

(2) Sources to purchase parts,

(3) List of disposable replacement parts, for example, air filters, fuel filters, oil filters, and tires,

(4) Engine specifications,

(5) Weight and balance information,

(6) Tire inflation pressures,

(7) Approved fluids and capacities,

(8) Recommended fastener torque values,

(9) General safety information, and

(10) Instructions for reporting possible safety of flight concerns found during inspection/maintenance.

5.1.1.2 *Inspections*—Instructions on and checklists for the completion of periodic and annual condition/100-h inspections as appropriate.

5.1.1.3 *Structures*—A description of and instructions for the maintenance, repair, and alteration of the aircraft primary structures such as:

(1) Wing (fixed, rotary, or inflatable),

(2) Empennage (tail section),

(3) Landing gear, and

(4) Structural control surfaces, for example, elevator (if applicable).

5.1.1.4 *Engine*—A description of and instruction for the maintenance, repair, and overhaul of the aircraft's engine, if the aircraft is powered.

NOTE 3—A light UAS manufacturer may defer to the engine manufacturer for the required maintenance, repair, and overhaul instructions.

5.1.1.5 *Fuel System*—A description of the system, schematic diagram, and instructions for the maintenance and repair of the aircraft fuel system, if a powered aircraft.

5.1.1.6 *Propeller*—A description of and instructions for the maintenance and repair of the propeller, if a powered aircraft.

NOTE 4—A light UAS manufacturer may defer to the propeller manufacturer for the required maintenance, repair, and overhaul instructions.

5.1.1.7 *Utility Systems*—A description of the systems and instructions for the maintenance and repair of utility systems such as heating, vent, and air-conditioning, if installed.

5.1.1.8 *Instruments and Avionics*—A description of and instructions for the maintenance, repair, replacement, and installation of existing and additional instruments and avionics, as applicable.

NOTE 5—A light UAS manufacturer may defer to the avionics/instrument manufacturer for the required maintenance, repair, and overhaul instructions.

5.1.1.9 *Electrical System*—A description of the system, schematic diagram, and instructions for the maintenance, repair, and alteration, as appropriate.

5.1.1.10 *Structural Repair*—A description of the structural repairs that are authorized without further consultation with the manufacturer.

5.1.1.11 *Painting and Coatings*—A description for the repair, replacement, or alteration, or a combination thereof, of paint or coatings used on the aircraft.

5.1.1.12 *Revisions*—A section, such as a change history table, for the listing of any revisions to the maintenance manual by the manufacturer.

5.1.1.13 *Feedback Form*—A form for the aircraft owner or maintainer to provide notification to the manufacturer about issues and anomalies identified during the operation or maintenance of the aircraft, or in the content of the manual.

5.1.2 *Ground Station*—The maintenance manual for the Ground Control Station shall have the following sections:

5.1.2.1 *General*—Listings of general specifications, capacities, and instructions for the Ground Station:

(1) Equipment list,

(2) Sources to purchase parts,

(3) List of disposable replacement parts, for example, air filters, desiccant, and so forth,

(4) List of non-disposable items, for example, data storage medium, and so forth,

(5) Equipment specifications,

(6) General safety information, and

(7) Instructions for reporting possible items that affect safety of flight of the aircraft; concerns found during flight operations/inspection/maintenance.

5.1.2.2 *Inspections*—Instructions on and checklists for the completion of annual/periodic condition inspection, as appropriate for the Ground Control Station.

5.1.2.3 *Utility Systems*—A description of the systems and instructions for the maintenance and repair of utility systems such as heating, vent, and air-conditioning, if installed.

5.1.2.4 *Electrical and Computing System*—A description of the system, schematic diagram, and instructions for the maintenance, repair, and alteration, as appropriate. The use of "built-in-tests" will allow this system to be maintained only "on condition".

5.1.2.5 *Painting and Coatings*—A description for the repair, replacement, or alteration, or a combination thereof, of paint or coatings used on the ground control station.

5.1.2.6 *Revisions*—A section, such as a change history table, for the listing of any revisions to the maintenance manual by the ground control station manufacturer.

5.1.2.7 *Feedback Form*—A form for the ground control station owner or maintainer to provide notification to the manufacturer about issues and anomalies identified during the operation or maintenance of the ground control station, or in the content of the manual.

5.1.3 *Ground Data Terminal*—The maintenance manual for the Ground Data Terminal shall have the following sections:

5.1.3.1 *General*—Listings of general specifications for the Data Link.

(1) Equipment list,

(2) Sources to purchase parts,

(3) List of disposable replacement parts, for example, air filters, desiccant, and so forth, if applicable,

(4) Lubrication schedule, if applicable,

(5) General safety information, and

(6) Instructions for reporting possible safety of flight concerns found during inspection/maintenance.

5.1.3.2 *Inspections*—Instructions on and checklists for the completion of annual/periodic condition inspections, as appropriate for the Ground Data Terminal.

5.1.3.3 *Utility Systems*—A description of the Ground Data Terminal systems and instructions for the maintenance and repair of utility systems such as heating, vent, and air-conditioning, if installed. If desiccant is required, the inspection and replacement schedule will be stated.

5.1.3.4 *Antenna Structural Repair*—A description of the Ground Data Terminal antenna structural repairs that are authorized without further consultation with the manufacturer.

5.1.3.5 *Electrical and Computing System*—A description of the Ground Data Terminal system, schematic diagram, and instructions for the maintenance, repair, and alteration, as appropriate. The use of "built-in-tests" will allow this system to be maintained only "on condition".

5.1.3.6 *Painting and Coatings*—A description for the repair, replacement, or alteration, or a combination thereof, of paint or coatings used on the Ground Data Terminal antennas.

5.1.3.7 *Revisions*—A section, such as a change history table, for the listing of any revisions to the maintenance manual by the Ground Data Terminal manufacturer.

5.1.3.8 *Feedback Form*—A form for the Ground Data Terminal owner or maintainer to provide notification to the manufacturer about issues and anomalies identified during the operation or maintenance of the data link or in the content of the manual.

5.2 *Inspection, Repair and Alterations*—Each of the inspections, repairs, and alterations outlined in the maintenance manual shall specifically list:

(1) Recommended special tools to accomplish the task,

(2) The parts needed to perform the task,

(3) Type of maintenance, for example, line, heavy, or overhaul,

(4) The level of certification needed to accomplish the task, for example, Owner, A&P, Repairman (Light UAS) inspection, repair station,

(5) Detailed instructions and diagrams as needed to perform the task, and

(6) Method to test/inspect to verify the task was accomplished properly.

5.2.1 *Repairs and Alterations*—Manufacturers may refer to other repair and alteration manuals, such as FAA's AC, for the detailed instructions to accomplish tasks outlined in the maintenance manual.

5.3 *Level of Certification*—When listing the level of certification needed to perform a task, the manufacturer shall use one of the following descriptors.

5.3.1 *Owner*—Items that can be expected to be completed by a responsible owner who holds a pilot certificate, but who has not received any specific authorized training.

NOTE 6—FAA regulations authorize light UAS aircraft owners who hold at least a light UAS Pilot Certificate to perform preventive maintenance as outlined in 14 CFR Part 43.

5.3.2 *Light UAS Repairman Inspection*—Items that can be expected to be completed on a light UAS by a responsible owner who holds an FAA repairman certificate (light-UAS) with an inspection rating or equivalent.

5.3.3 *Light UAS Repairman Maintenance*—Items that can be expected to be completed on a light UAS by a responsible individual who holds an FAA repairman certificate (light-UAS) with a maintenance rating or equivalent.

5.3.4 *A&P*—Items that can be expected to be completed by a responsible individual who holds a mechanic certificate with airframe or powerplant ratings, or both, or equivalent.

5.3.5 *Task Specific*—Items that can be expected to be completed by a responsible individual who holds either an mechanic certificate or a repairman certificate, and has received task specific training to perform the task.

5.3.5.1 When specifying the "task specific" level of certification, the manufacturer must also specify the specific training required.

5.3.6 Multiple descriptors and modifiers may be used, for example, a manufacture may list under level of certification required for the replacement of a piston engine valve, "A&P or Light UAS Repairman Maintenance Task Specific".

6. UAS Line Maintenance, Repairs, and Alterations

6.1 *Aircraft Line Maintenance, Repairs, and Alterations*:

6.1.1 *Authorization to Perform*—The holder of a light UAS repairman certificate with either an inspection or maintenance rating is generally considered the minimum level of certification to perform aircraft line maintenance of light UAS.

NOTE 7—Many of the tasks listed are also authorized by the FAA to be performed by the owner of the light UAS who holds a sport pilot certificate. The examples listed below should not be considered as restrictions against the performance of the tasks by an owner that is authorized to perform said task by the FAA.

6.1.2 Typical tasks considered as line maintenance for light UAS aircraft include:

6.1.2.1 100-h inspection,

6.1.2.2 Annual condition inspection,

6.1.2.3 Servicing of fluids,

6.1.2.4 Removal and replacement of components for which instructions are provided in the maintenance manual, such as:

(1) Fuel pumps,

(2) Batteries,

(3) Instruments, switches, lights, and circuit breakers,

(4) Starters/generators/alternators,

(5) Exhaust manifolds/mufflers,

(6) Wheel and brake assemblies,

(7) Propellers,

(8) Sparkplugs, ignition wires and electronic ignition models/components limited to the use of mechanical connections,

(9) Hoses and lines,

(10) Sailcloth covering,

(11) Ballistic recovery system,

(12) Floats, and

(13) Skis.

6.1.2.5 Repair of components and structure for which instructions are provided in the maintenance manual and which do not require additional specialized training such as:

(1) Patching of a hole in a fabric, metal, or composite non-structural component, and

(2) Stop-drilling of cracks.

6.1.2.6 Alterations for which specific instruction are provided in the maintenance manual such as:

(1) Installation of a communications radio, transponder, GPS, and antenna,

(2) Installation of a strobe light system, and

(3) Compliance with a manufacturer service directive when the repairman is listed as an authorized person to accomplish the alteration.

6.2 *Ground Station Line Maintenance, Repairs, and Alterations*:

6.2.1 *Authorization to Perform*—The holder of a light UAS repairman certificate with either an inspection or maintenance rating is generally considered the minimum level of certification to perform ground station line maintenance for a light UAS.

NOTE 8—Many of the tasks listed are also authorized by the FAA to be performed by the owner of the light UAS who holds a sport pilot certificate. The examples listed below should not be considered as restrictions against the performance of the tasks by an owner that is authorized to perform said task by the FAA.

6.2.2 Typical tasks considered as line maintenance for light UAS ground station include:

6.2.2.1 Scheduled inspections,

6.2.2.2 Servicing of fluids associated with the ground station,

6.2.2.3 Removal and replacement of components for which instructions are provided in the maintenance manual, such as:

(1) Batteries, and

(2) Instruments, switches, lights, and circuit breakers.

6.2.2.4 Alterations for which specific instruction are provided in the maintenance manual, such as:

(1) Installation of a communications radio, transponder, GPS, and antenna,

(2) Installation of a lighting system, and

(3) Compliance with a manufacturer service directive when the repairman is listed as an authorized person to accomplish the alteration.

6.3 *Ground Data Terminal Line Maintenance, Repairs, and Alterations*:

6.3.1 *Authorization to Perform*—The holder of a light UAS repairman certificate with either an inspection or maintenance rating is generally considered the minimum level of certification to perform ground data terminal line maintenance for a light UAS.

NOTE 9—Many of the tasks listed are also authorized by the FAA to be performed by the owner of the light UAS who holds a sport pilot certificate. The examples listed below should not be considered as

restrictions against the performance of the tasks by an owner that is authorized to perform said task by the FAA.

6.3.2 Typical tasks considered as line maintenance for light UAS ground data terminal include:

6.3.2.1 Scheduled inspections,

6.3.2.2 Servicing of fluids associated with the ground data terminal,

6.3.2.3 Removal and replacement of components for which instructions are provided in the maintenance manual, such as:

(1) Batteries, and

(2) Instruments, switches, lights, and circuit breakers.

6.3.2.4 Alterations for which specific instructions are provided in the maintenance manual, such as:

(1) Installation of a communications radio, transponder, GPS, and antenna,

(2) Installation of a lighting system, and

(3) Compliance with a manufacturer service directive when the repairman is listed as an authorized person to accomplish the alteration.

7. UAS Heavy Maintenance, Repairs, and Alterations

7.1 *UAS Aircraft Heavy Maintenance, Repairs, and Alterations*:

7.1.1 *Authorization to Perform*—The holder of a mechanic certificate with airframe or powerplant rating(s), or both, or a light UAS repairman maintenance who has received additional task specific training for the function to be performed is generally considered the minimum level of certification to perform aircraft heavy maintenance of light UAS.

7.1.2 Typical tasks considered as aircraft heavy maintenance for the light UAS include:

7.1.2.1 Removal and replacement of aircraft components for which instructions are provided in the maintenance manual or service directive instructions, such as:

(1) Complete engine removal and reinstallation in support of an engine overhaul or to install a new engine,

(2) Removal and replacement of engine cylinders, pistons, or valve assemblies, or a combination thereof,

(3) Primary flight control cables/components, and

(4) Landing gear assemblies.

7.1.2.2 Repair of aircraft components or aircraft structure, or both, for which instructions are provided in the maintenance manual or service directive instructions, such as:

(1) Repainting of control surfaces,

(2) Structural repairs, and

(3) Recovering of a dope and fabric covered aircraft.

7.1.2.3 Alterations of aircraft components or aircraft structure, or both, which instructions are provided in the maintenance manual or service directive instruction, such as:

(1) Initial installation of skis, and

(2) Installation of new additional pitot-static instruments.

7.2 *UAS Ground Station Heavy Maintenance, Repairs, and Alterations*—Does not apply—it is generally more productive/cost effective to buy new items.

7.3 *UAS Ground Data Terminal Heavy Maintenance, Repairs, and Alterations*—Does not apply—it is generally more productive/cost effective to buy new items.

8. UAS Overhaul

8.1 *UAS Aircraft Overhaul*:

8.1.1 *Authorization to Perform*—Only the manufacturer, or their representative, of a light UAS or the component to be overhauled on a light UAS aircraft may perform or authorize to be performed the aircraft overhaul of a light UAS component.

NOTE 10—In the U.S., no FAA certification is given to be a light UAS approved overhaul facility.

8.1.2 *Aircraft Overhaul Manual*—A separate aircraft overhaul manual, in addition to the manufacturer's aircraft maintenance manual, is required to perform the overhaul of a light UAS aircraft or light UAS aircraft component.

NOTE 11—The form and content of such a manual is not governed by this practice or by any FAA regulation.

NOTE 12—Specific form and content guidelines have not been promulgated here as type-specific training and authorization is required from the manufacturer in order to overhaul a light UAS aircraft or aircraft component.

8.1.3 Typical components that are overhauled include:

(1) Engines,

(2) Carburetors/fuel injection systems,

(3) Starters/alternators/generators, and

(4) Instruments.

8.2 *UAS Ground Station Overhaul*—Does not apply—it is generally more productive/cost effective to buy new items.

8.3 *UAS Ground Data Terminal Overhaul*—Does not apply—it is generally more productive/cost effective to buy new items.

9. UAS Major Repairs and Alterations

9.1 *UAS Aircraft Major Repairs and Alterations*:

9.1.1 All major repairs or alterations made to an aircraft subsequent to its initial design and production acceptance testing to applicable ASTM standards and sale to a consumer must be evaluated relative to the requirements of the applicable ASTM design and production acceptance specification(s).

9.1.2 The manufacturer or other entity that performs the evaluation of an alteration or repair shall provide a written affidavit that the aircraft being altered will still meet the requirements of the applicable ASTM design and performance specification subsequent to the alteration.

9.1.3 The manufacturer or other entity that performs the evaluation shall provide written instructions and diagrams on how, who, and the level of certification needed to perform the alteration or repair.

9.1.3.1 The instructions must include ground and flight testing that complies with the original ASTM production acceptance testing standard as appropriate to verify the alteration was performed correctly and the aircraft is in a condition for safe operation.

9.1.4 The manufacturer or other entity that performs the evaluation shall provide information to the owner of the aircraft for the documentation of the alteration in the aircraft's records.

9.2 *UAS Ground Station Major Repairs and Alterations*:

9.2.1 All major repairs or alterations made to Ground Station subsequent to its initial design and production acceptance testing to applicable ASTM standards and sale to a

consumer must be evaluated relative to the requirements of the applicable ASTM design and production acceptance specification(s).

9.2.2 The manufacturer or other entity that performs the evaluation of an alteration or repair shall provide a written affidavit that the Ground Station being altered will still meet the requirements of the applicable ASTM design and performance specification subsequent to the alteration.

9.2.3 The instructions must include ground and flight testing that complies with the original ASTM production acceptance testing standard as appropriate to verify the alteration was performed correctly and the Ground Station is in a condition for safe operation of the aircraft.

9.2.4 The manufacturer or other entity that performs the evaluation shall provide information to the owner of the Ground Station for the documentation of the alteration in the Ground Station records.

9.3 *UAS Ground Data Terminal Major Repairs and Alterations*:

9.3.1 All major repairs or alterations made to Ground Data Terminal subsequent to its initial design and production acceptance testing to applicable ASTM standards and sale to a consumer must be evaluated relative to the requirements of the applicable ASTM design and production acceptance specification(s).

9.3.2 The manufacturer or other entity that performs the evaluation of an alteration or repair shall provide written affidavit that the Ground Data Terminal being altered will still meet the requirements of the applicable ASTM design and performance specification subsequent to the alteration.

9.3.3 The instructions must include ground and flight testing that complies with the original ASTM production acceptance testing standard as appropriate to verify the alteration was performed correctly and the Ground Data Terminal is in a condition for safe operation of the aircraft.

9.3.4 The manufacturer or other entity that performs the evaluation shall provide information to the owner of the Ground Data Terminal for the documentation of the alteration in the aircraft's records.

10. Task Specific Training

10.1 A manufacturer of a product may require type specific training in order to accomplish a task in either the maintenance manual or in an authorization for a major repair, maintenance, or alteration. The FAA does not give approval to these task specific training programs for Light UAS. A manufacturer may specify any task specific training it determines is appropriate to accomplish a task.

10.2 Examples of task specific training include:

10.2.1 Engine manufacturer heavy maintenance or overhaul school, or both, and

10.2.2 UAS manufacturer course.

11. Safety Directives

11.1 The light UAS may have a safety directive issued against the UAS or component part. The original aircraft manufacturer issues the directive as outlined in the applicable ASTM continued airworthiness standard.

NOTE 13—The Light UAS and components installed on the light UAS do not have airworthiness directives issued against them. If an AD is issued against a type-certificated product that may be incorporated into the light UAS, the manufacturer of the UAS is required in accordance with Practice F 2295, Specification F 2241, or Practice F 2415 to issue a safety directive providing instruction on how to address the safety defect outlined in the AD on the specific light UAS.

11.2 The original light UAS manufacturer is responsible for providing the applicable instructions to comply with any safety directive, that will include:

11.2.1 A list of the tools needed to accomplish the task,

11.2.2 A list of the parts needed to perform the task,

11.2.3 Type of maintenance, for example, line, heavy, overhaul,

11.2.4 The level of certification needed to accomplish the task, for example, A&P, repairman inspection,

11.2.5 Detailed instructions and diagrams as needed to perform the task, and

11.2.6 Method to test/inspect to verify the task was accomplished properly.

11.3 Service directives are considered as mandatory tasks in order to maintain a condition of safe operation and compliance with the applicable original ASTM design standard.

NOTE 14—Service directives are not considered mandatory for experimental light UAS in the U.S.

12. Keywords

12.1 aircraft alterations; aircraft inspections; aircraft maintenance; aircraft repairs; light UAS; maintenance manual; unmanned aircraft

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLE OF THE FORM AND CONTENT OF A LIGHT UAS MAINTENANCE MANUAL

4. WING
4.1 Wing removal
4.1.1 Required Tools: Vi in socket wrench, #2 Philips screwdriver, Jack stands (3) with 12 to 30 in. range of support
4.1.2 Parts required: None
4.1.3 Level of maintenance: Heavy
4.1.4 Certification required: A&P Mechanic or Light UAS Repairman Maintenance
Note: Depending on the complexity of the aircraft this task may or may not require additional type specific training. Each manufacturer must make this decision for their own product.
4.2 Remove outer wing fairing (Fig. 4.1)
Remove fairing attach screws (3)
Lower flaps and remove upper retaining bolt (2)
Raise flaps and remove lower retaining bolt (2)
Identify electrical connections for lights and disconnect (Fig. 4.2)
Caution master switch must be off
4.3 Remove inner wing fairing strip attachment screws (15)
4.4 Remove lower inspection plates
4.5 Drain fuel from wing tank
4.6 Disconnect fuel line at wing fuselage junction (Fig 4.3)
4.7 Disconnect flap cable at bellcrank (Fig. 4.4)
4.8 Remove nut (1) and bolt (1) and disconnect flap, push pull tube at wing fuselage junction (Fig 4.5)
4.9 Support flap and remove hinge pins (3), remove flap (Fig. 4.6)
4.10 Support wing at three hard points as shown in Fig 4.7
4.11 Remove inner wing spar, attach bolt (2) for front and rear spar located in fuselage (Fig. 4.8)
4.12 Remove outer wing spar, attach bolts (2)
4.13 Carefully remove wing with assistance of an additional person or overhead hoist
Note: Wing weight approximately 80 pounds.

X2. EXAMPLE OF THE FORM AND CONTENT FOR AN INSPECTION PROCEDURE IN THE LIGHT UAS MAINTENANCE MANUAL—UAS AIRCRAFT

Condition Inspection Checklist Compiled from FAR 43, Appendix D

UAS Make/Model: _____Super duper II_____ S/N: _____
Engine Make/Model: _____(as appropriate)_____ S/N: _____
Date of Inspection: _____ TT Airframe: _____
TT Engine: _____

Scope and Detail of Items (as Applicable to the Particular UAS) to be Included in Annual and 100-h Inspections

(a) Each person performing an annual or 100-h inspection shall, before that inspection, remove or open all necessary inspection plates, access doors, fairing, and cowling. He shall thoroughly clean the aircraft and aircraft engine after initial visual inspection for oil, exhaust or other leaks as applicable is completed.

(b) Each person performing an annual or 100-h inspection shall inspect (where applicable) the following components of the fuselage and hull group:
____ Pass ____ Fail (1) Fabric and skin-for deterioration, distortion, other evidence of failure, and defective or insecure attachment of fittings.
____ Pass ____ Fail (2) Systems and components-for improper installation, apparent defects, and unsatisfactory operation.

(c) Each person performing an annual or 100-h inspection shall inspect (where applicable) the following components of the cabin and cockpit group:
____ Pass ____ Fail (1) Generally\for uncleanliness and loose equipment that might foul the controls.
____ Pass ____ Fail (2) Seats and safety belts\for poor condition and apparent defects.
____ Pass ____ Fail (3) Windows and windshields\for deterioration and breakage.
____ Pass ____ Fail (4) Instruments\for poor condition, mounting, marking, and (where practicable) improper operation.
____ Pass ____ Fail (5) Flight and engine controls\for improper installation and improper operation.
____ Pass ____ Fail (6) Batteries\for improper installation and improper charge.
____ Pass ____ Fail (7) All systems\for improper installation, poor general condition, apparent and obvious defects, and insecurity of attachment.

(d) Each person performing an annual or 100-h inspection shall inspect (where applicable) components of the engine and nacelle group as follows:

____ Pass ____ Fail (1) Engine section\for visual evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks.
____ Pass ____ Fail (2) Studs and nuts\for improper torquing and obvious defects.
____ Pass ____ Fail (3) Internal engine\for cylinder compression and for metal particles or foreign matter on screens and sump drain plugs. If there is weak cylinder compression, for improper internal condition and improper internal tolerances.
____ Pass ____ Fail (4) Engine mount\for cracks, looseness of mounting, and looseness of engine to mount.
____ Pass ____ Fail (5) Flexible vibration dampeners\for poor condition and deterioration.
____ Pass ____ Fail (6) Engine controls\for defects, improper travel, and improper safetying.
____ Pass ____ Fail (7) Lines, hoses, and clamps-for leaks, improper condition and looseness.
____ Pass ____ Fail (8) Exhaust stacks\for cracks, defects, and improper attachment.
____ Pass ____ Fail (9) Accessories\for apparent defects in security of mounting.
____ Pass ____ Fail (10) All systems\for improper installation, poor general condition, defects, and insecure attachment.
____ Pass ____ Fail (11) Cowling\for cracks, and defects.

(e) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the landing gear group:
____ Pass ____ Fail (1) All units\for poor condition and insecurity of attachment.
____ Pass ____ Fail (2) Shock absorbing devices\for improper oleo fluid level.
____ Pass ____ Fail (3) Linkages, trusses, and members\for undue or excessive wear fatigue, and distortion.
____ Pass ____ Fail (4) Retracting and locking mechanism\for improper operation.
____ Pass ____ Fail (5) Hydraulic lines\for leakage.
____ Pass ____ Fail (6) Electrical system\for chafing and improper operation of switches.
____ Pass ____ Fail (7) Wheels\for cracks, defects, and condition of bearings.
____ Pass ____ Fail (8) Tires\for wear and cuts.
____ Pass ____ Fail (9) Brakes\for improper adjustment.
____ Pass ____ Fail (10) Floats and skis\for insecure attachment and obvious or apparent defects.

(f) Each person performing an annual or 100-h inspection shall inspect (where applicable) all components of the wing and center section assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, and insecurity of attachment.

(g) Each person performing an annual or 100-h inspection shall inspect (where applicable) all components and systems that make up the complete empennage assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, insecure attachment, improper component installation, and improper component operation.

(h) Each person performing an annual or 100-h inspection shall inspect (where applicable) the following components of the propeller group:
____ Pass ____ Fail (1) Propeller assembly\for cracks, nicks, binds, and oil leakage.
____ Pass ____ Fail (2) Bolts\for improper torquing and lack of safetying.

(i) Each person performing an annual or 100-h inspection shall inspect (where applicable) the following components of the radio group:
____ Pass ____ Fail (1) Radio and electronic equipment\for improper installation and insecure mounting.
____ Pass ____ Fail (2) Wiring and conduits\for improper routing, insecure mounting, and obvious defects.
____ Pass ____ Fail (3) Bonding and shielding\for improper installation and poor condition.
____ Pass ____ Fail (4) Antenna including trailing antenna\for poor condition, insecure mounting, and improper operation.

(j) Each person performing an annual or 100-h inspection shall inspect (where applicable) each installed piece of optional equipment on this listing for improper installation and improper operation.
____ Pass ____ Fail Fail Option number one
____ Pass ____ Fail Fail Option number two
____ Pass ____ Fail Fail Option number three
____ Pass ____ Fail Fail Option number four

(k) Each person performing an annual or 100-h inspection shall remove and inspect the ELT installed for proper operation of the ″G″ switch and calendar date currency of the batteries installed in accordance with FAA Advisory Circular 91-44 current revision.

Notes and explanation of non-airworthy items found:

_____
_____
_____
_____