KELLY AEROSPACE

Thermal Systems

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# Revisions

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| A | Initial Release (ECN 20-017) | Eric Farmer | 10/07/2020 | Jeff Barlett |
| B | Added Magnetometer Relocation and Inspection Port References (ECN 21-006) | Eric Farmer | 3/03/2021 | Jeff Barlett |
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The latest revision of the maintenance manual can be obtained from the Kelly Aerospace website at www.kellythermal.com.

In the event Internet access is not available, please contact the Customer Service Office for inquiry or a copy of the latest revision:

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1625 Lost Nation Road
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440-951-4744

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# 1. INTRODUCTION

## 1.1. Purpose

This document is designed for use by the installing agency of Kelly Aerospace Thermal Systems Air Conditioning Kit Number KATS-19-005, KATS-19-006 or KATS-19-007 as Instructions for Continued Airworthiness in response to Federal Aviation regulation (FAR) Part 23.1529, and Part 23 Appendix G. The ICA includes information required by the operator to adequately maintain the Air Conditioning System installed.

## 1.2. Scope

This document identifies the Instruction for Continued Airworthiness for the modification of the aircraft for installation of the Kelly Aerospace Thermal Systems Air Conditioning Kit Number KATS-19-005, KATS-19-006 or KATS-19-007 under the approved STC.

## 1.3. Document Control

This document shall be released, archived and controlled in accordance with the Kelly Aerospace Thermal Systems document control system. When this document is revised, refer to Section 2.15 ICA Revision and Distribution for information on how to gain FAA acceptance or approval and how to notify customers of changes.

## 1.4. Airworthiness Limitations

There are no additional Airworthiness Limitations as defined in 14 CFR § 23, Appendix G. G23.4 that result from this modification. The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

## 1.5. Permission to Use Certain Documents

Permission is granted to any corporation or person applying for approval of a Kelly Aerospace Thermal Systems Air Conditioning System Kit to use and reference appropriate STC documents to accomplish the Instructions for Continued Airworthiness and show compliance with STC engineering data. This permission does not construe suitability of the documents. It is the responsibility of the applicant to determine the suitability of the documents for the ICA.

## 1.6. Definitions

The following terminology is used within this document:

1) **ACO:** Aircraft Certification Office
2) **AEG:** Aircraft Evaluation Group
3) **CFR:** Code of Federal Regulations
4) **DER:** Designated Engineering Representative
5) **FAA:** Federal Aviation Administration
6) **ICA:** Instructions for Continued Airworthiness
7) **STC:** Supplemental Type Certificate
8) **KATS:** Kelly Aerospace Thermal Systems

# 2. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

## 2.1. Introduction

| | |
|---|---|
| Content, Scope, Purpose and Arrangement: | This document identifies the Instructions for Continued Airworthiness for the modification of the aircraft by installation of the Kelly Aerospace Thermal Systems Air Conditioning Kit Number KATS-19-005, KATS-19-006 or KATS-19-007. |
| Applicability: | Applies to aircraft altered by installation of the Kelly Aerospace Thermal Systems Air Conditioning Kit Number KATS-19-005, KATS-19-006 or KATS-19-007. |
| Definition of Abbreviations: | See Section 1.6 Definitions |
| Precautions: | None |
| Units of measurement: | None |
| Referenced publications: | NC-19-037: Tecnam P2010 Air Conditioning System Drawing List<br>NC-19-038: Tecnam P2010 Air Conditioning System Kit List<br>NC-19-039: Tecnam Air Conditioning System Installation Manual<br>NC-19-042: Tecnam P2010 Air Conditioning System Weight & Balance<br>AC-02105 P2010 Evaporator Installation Details<br>AC-02138 P2010 F8 Tail Cone Cover Modification Detail<br>AC-02155 P2010 F3 Tail Cone Vent Modification & Moving Details<br>AC-02165 Tecnam P2010 Air Conditioning Schematic<br>AC-02177 P2010 F2 Tail Cone Cover Modification Detail<br>AC-02181: P2010 Hot Side Installation Details<br>AC-02188: P2010 Evaporator for A1235 Installation Details<br>AC-02440: P2010 GMU-44 Relocation Details<br>Tecnam P2010 Aircraft Maintenance Manual<br>Tecnam P2010 Illustrated Parts Catalog<br>AC 43.13-1B: Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair |
| Retention: | This document or the information contained within, shall be included in the aircraft's permanent records |

## 2.2. Description of Alteration

The Air Conditioning System consists of an electric hermetically sealed compressor and condenser located in the tail cone and evaporator mounted behind the bulkhead just aft of the baggage compartment. The system is operated through temperature selection and a climate controller located on the instrument panel. There is both a fan mode only and a cooling mode. R-134a is used as a refrigerant for the system.

The power for the Air Conditioning System is tapped off the battery terminal of the upgraded alternator.

An electrical load analysis was done for this STC. If the aircraft has an alternator rated at 150 amps per the STC; the Air Conditioning System can be operated any time after engine start-up.

See Document NC-19-042 Tecnam P2010 Air Conditioning System Weight & Balance to see the effect of the Air Conditioning System on the weight and balance for the aircraft.

## 2.3. Control, Operating Information

The system is operated through temperature/fan speed selection on a climate controller located in the instrument panel or center console. .

The system may be operated during all phases of operation, including level flight, takeoff and landing or on the ground during taxi.

The Air Conditioning System has three optional controllers. KATS-19-005 uses the CB-2 Controller, KATS-19-006 uses Toggle Switch Controls and KATS-19-007 uses the A1235 Controller. The CB-2 Controller and the Toggle Switch Control uses relays to control the evaporator fan speed. See section 2.3.1 for instructions for using the CB-2 Controller. See section 2.3.2 for instructions for using Toggle Switch Controls.

The A1235 Controller uses PWM (Pulse Width Modulation) to control the evaporator fan speed. See section 2.3.3 for instructions for using the A1235 controller.

### 2.3.1. Air Conditioning System Normal Checklist: CB-2 Climate Controller


**Figure 1** – CB-2 Controller

**Prior to Engine Start**

1) Ensure Air Conditioning is OFF by verifying that there is nothing displayed on the CB-2 climate controller LCD screen.
2) Follow normal procedures for engine start-up.

**Air Conditioning AC Mode**

1) Press the lower right button on the CB-2 Climate Controller, the display will first show the logo and software version; then it will show temperature set point, fan speed bar graph, and mode display.
2) Press the bottom left button and toggle between modes with the middle right button.
3) After selecting AC mode, either press the bottom right button to enter or wait 3 seconds and the display will return to the main screen. The snow flake symbol in the bottom center of the display will indicate Air Conditioning mode

**Air Conditioning Fan Only Mode**

1) Press the bottom left button and toggle between modes with the middle right button.
2) After selecting fan mode, either press the bottom right button to enter or wait 3 seconds and the display will return to the main screen.

**To Control Fan Speed**

1) Press the middle left button to bring up the fan speed screen.
2) Toggle the fan speed up or down using the middle and upper right buttons. Speed Range is 1 to 3.
3) After selecting desired fan speed press the bottom right button to enter or wait 3 seconds and the display will return to the main screen. The fan speed bar graph on the right side of the screen will show selected fan speed. Fan speed can be controlled in both AC and Fan Only modes.

**Changing Temperature Set Point**

1) Press the top or middle right buttons to adjust the temperature set point up or down.
2) The set point temperature will be displayed with an SP indication. The CB-2 display will default to the temperature set point.

**To display cabin temperature**

1) Press and release the bottom right button, the cabin temperature will be displayed with a TEMP indication. After a few seconds the temperature set point will be displayed again.

**To turn air conditioning system off**

1) Press and hold lower right button.

### 2.3.2. Air Conditioning System Normal Checklist with Toggle Switch Control

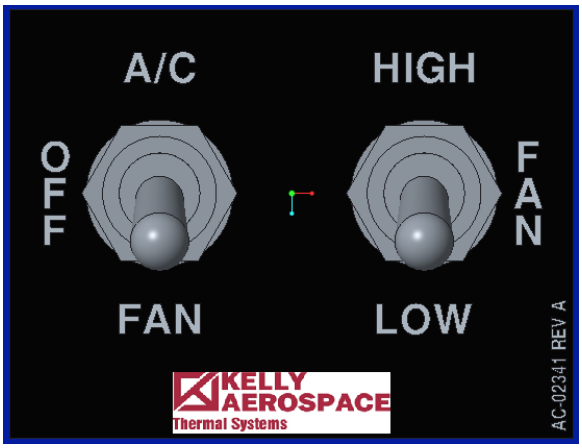


**Figure 2** – Toggle Switch Control

**Prior to Engine Start**

1) Ensure Air Conditioning Switch is in OFF (middle) position.
2) Follow normal procedures for engine start-up.

**Fan Mode**

1) Air Conditioner switch set to FAN.
2) Fan Speed switch, Select HI or LOW.

**Air Conditioning Mode**

1) Air Conditioner switch set to A/C.
2) Fan Speed switch, Select HI or LOW.

**To Turn Air Conditioning System Off**

1) Air Conditioner switch set to OFF position.

## 2.3.3. Air Conditioning System Normal Checklist: A1235 Climate Controller

### Climate Controller Power-On Self Check

1) Climate controller initiates a self-check at power-on. A fault is indicated by the red “FAIL” illuminated. Normal operation defaults to FAN Mode with a fan speed “0”.


**Figure 3** – A1235 Controller Front Panel - Self Check Mode

### Prior to Engine Start

1) Ensure Air Conditioning is OFF by verifying that the “AC” light is not illuminated; press the “FAN ▼” until the display shows a fan speed of “0”.
2) Follow normal procedures for engine start-up.

### Air Conditioning AC Mode

1) Push the AC button to toggle operating modes between “FAN” and “AC”.
2) Select “AC”.
3) Adjust desired temperature using “TEMP” buttons. Evaporator fan speed will adjust automatically based on set temperature and actual temperature indicated.


**Figure 4** – A1235 Controller Front Panel – AC Mode

**Air Conditioning Fan Mode**

1) Ensure the “AC” light is not illuminated; otherwise press the AC button to toggle operating modes between “FAN” and “AC”.
2) Select “FAN”
3) Adjust desired fan speed using “FAN” buttons. Speed Range is “0” to “5”.


**Figure 5** – A1235 Controller Front Panel – Fan Mode

**Air Conditioning Fault**

1) Red “FAIL” light illuminated indicates a fault has occurred.
2) Select “FAN” Mode.

**Before Engine Shut-Down**

1) Turn “OFF” Air Conditioner.

## 2.4. Servicing Information

Charging the system with Refrigerant:

Only trained and qualified personnel may service this system.

The Air Conditioning System should contain 16 oz. of R-134A Refrigerant. There are no substitutions permitted.

1) Remove the Baggage Compartment Panel RWD and Baggage Net if required.
2) Connect a Refrigerant Recovery, Recycling & Recharging Machine to the service ports. The service ports are located just aft of the Hat Rack and the Access Door. The small service port is the high pressure side and the large service port is the low pressure side.
3) Following the Refrigerant Recovery, Recycling & Recharging Machine manufacturer's instructions, perform the following:
    a) Evacuate the system.
    b) Pull a vacuum to 500 microns of mercury (.01 PSI) or less and hold for a minimum of 1 hour.
    c) Fill the system with 16 +/- 2 ounces of R-134A Refrigerant.
4) Disconnect the service machine and replace the service port caps.
5) Replace the Baggage Compartment Panel RWD and Baggage Net.

**Caution:** It is vital that the compressor is NOT operated while the system is under vacuum. Doing so will instantly damage the compressor.

## 2.5. Maintenance Instructions

There are no maintenance requirements for the Air-conditioning System outside of normal 100hr/Annual inspection intervals.

Perform a system functional test after any maintenance is performed on the Air Conditioning System to ensure the system is working correctly.

Follow the procedures shown in:
Section 2.3.1 Air Conditioning System Normal Checklist: CB-2 Climate Controller or;
Section 2.3.2 Air Conditioning System Normal Checklist with Toggle Switch Control or;
Section 2.3.3 Air Conditioning System Normal Checklist: A1235 Climate Controller.

**Note:** Before inspections or maintenance is performed it is the responsibility of the owner/operator and maintenance agency to assure that they are in possession of the appropriate revision of the applicable documentation and drawings by referencing the NC-19-037 Tecnam P2010 Air Conditioning System Drawing List provided with the Air Conditioning System Kit.

## 2.6. Troubleshooting Information

Failures of the Kelly Aerospace Air Conditioning System can include but may not be limited to the following items:

1) Fan motor failure, characterized by no or little airflow. Corrective action: Troubleshoot the fan motor wiring, relay and fan for proper operation, repair or replace as necessary.

2) Compressor failure, characterized by low amp draw, or little cold air output. Corrective action: Troubleshoot compressor and compressor controller and wiring, repair or replace as necessary.

3) Low or no refrigerant, characterized by little or no cold air. Corrective Action: Inspect system for leaks, repair as necessary, and service system appropriately with R-134A refrigerant. See Section 2.4 Servicing Information.

4) Any or all of these probable failures require inspection as necessary, or system must be secured and placarded until repaired.

## 2.7. Removal and Replacement Information

When replacement of any refrigerant containing device is necessary, such as a compressor or evaporator, it is necessary to evacuate the refrigerant prior to removal. An EPA approved refrigerant evacuation machine is required. Prior to recharging the system with refrigerant, the system must be evacuated. Allow the vacuum source to remain connected for a minimum of one hour to assure there are no leaks and verify system integrity.

If a component needs to be removed or replaced, review the NC-19-039 Tecnam Air Conditioning System Installation Manual.

Reference: AC-02181 P2010 Hot Side Installation Details for basic structural information

Reference: AC-02105 P2010 Evaporator Installation Details for basic structural information for CB-2 or Toggle switch controls

Reference: AC-02188 P2010 Evaporator Installation Details for basic structural information for A1235 controls

Reference: AC-02165 P2010 Air Conditioning Schematic for electrical information

Reference: AC-02138 P2010 F8 Tail Cone Cover Modification Detail

Reference: AC-02155 P2010 F3 Tail Cone Vent Modification & Moving Details

Reference: AC-02177 P2010 F2 Tail Cone Cover Modification Detail

Reference: AC-02440 P2010 GMU-44 Relocation Details

All required KATS drawings and documents are provided by Kelly Aerospace Thermal Systems in either Kit Number KATS-19-005 (CB-2) or KATS-19-006 (Toggle Switch Controls) or KATS-19-007 (A1235). Replacement documents may be obtained by contacting Kelly Aerospace by calling 440-951-4744.

## 2.8. Diagrams

AC-02138 P2010 Hot Side Installation Details

AC-02105 P2010 Evaporator Details (CB-2 or Toggle Switch)

AC-02188 P2010 Evaporator Details (A1235)

AC-02165 P2010 Air Conditioning Schematic

All required KATS drawings and documents are provided by Kelly Aerospace Thermal Systems in either Kit Number KATS-19-005 (CB-2) or KATS-19-006 (Toggle Switch Controls) or KATS-19-007 (A1235). Replacement documents may be obtained by contacting Kelly Aerospace by calling 440-951-4744.

## 2.9. Special Inspection Requirements

Inspect the system during 100 Hour and/or Annual inspections.

During the annual or 100 hour inspections check for the following items:

1. Security of attachment of all components.
2. Evidence of any leaks.
3. Fretting or cracking of any sheet metal structures.
4. Insect or animal nests in condenser or evaporator sections.
5. Bent or obstructed fins on the condenser and evaporator coils.
6. Loose or missing hardware.
7. Loose or chaffing tubing.
8. Loose or chaffing wires.
9. Reference P2010 Maintenance Manual Inspection Program ATA 57 Wings. Include new inspection port when visually inspecting the internal structure of the wing through wings inspections caps.

## 2.10. Application of Protective Treatments

None, N/A.

## 2.11. Data Related to Structural Fasteners

Structural fasteners should be installed per AC43.13-1B.

| Unless otherwise specified, use the following torque values. | |
|---|---|
| 6-32 UNC | 7-9 inch-lbs. |
| 8-32 UNC | 17-19 inch-lbs. |
| 10-24 UNC | 20-22 inch-lbs. |
| 10-32 UNF | 28-31 inch-lbs. |
| 1/4-20 UNC | 70-75 inch-lbs. |
| 1/4-28 UNF | 90-94 inch-lbs. |
| 5/16-24 UNF | 120-145 inch-lbs. |
| 3/8-24 UNF | 200-250 inch-lbs. |
| 7/16-20 UNF | 520-630 inch-lbs. |
| **Table 1** – Fastener Torque Specifications | |

| Unless otherwise specified, use the following torque values. | |
|---|---|
| 5/8-18 UNF | 15-20 inch.-lbs. |
| 3/4-16 UNF | 21-27 inch-lbs. |
| 7/8-14 UNF | 28-33 inch-lbs. |
| 7/8-18 UNS | 28-33 inch-lbs. |
| **Table 2** – A/C Hose Fitting Torque Specifications | |

Refer to the Tecnam P2010 Aircraft Maintenance Manual

## 2.12. Special Tools

An EPA approved refrigerant evacuation /charging machine is required.

## 2.13. Additional Instructions

None

## 2.14. Overhaul Period

No additional overhaul time limitations.

## 2.15. ICA Revision and Distribution

To revise this ICA, a letter must be submitted to the ACO along with the revised ICA. The ACO will obtain AEG acceptance and approve any revision to Section1.4 Airworthiness Limitations. After FAA acceptance / approval Kelly Aerospace will release the revised ICA for customer use and provide any required notification of the revision.

## 2.16. Assistance

The customer may refer questions regarding this equipment and its installation to the manufacturer, Kelly Aerospace Thermal Systems. Kelly Aerospace customer assistance may be contacted during normal business hour via telephone 440-951-4744 or email from Kelly Aerospace website at www.kellythermal.com.

## 2.17. Implementation and Record Keeping

Modification of an aircraft by this Supplemental Type Certificate obligates the aircraft operator to include the maintenance information provided by this document in the operator's aircraft maintenance manual and/or the operator's aircraft scheduled maintenance program.