Qualification Test Report

QTR-00012

For

VIVISUN LOGIC Series (Electronic Latching and Pulse / Timer options) and LED Switch With and Without Discrete Dimming

In accordance with
RTCA DO-160F

By
Aerospace Optics, Inc.
May 10, 2011

Aerospace Optics, Inc. Quality Control Approval:

Brian Wish, Vice President, Quality

Aerospace Optics, Inc. Company Representative Approval:

Loren K. Jensen, President and COO

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Test Result - Overall

The test articles and test set-ups for the testing were all properly conformed. The test procedure was approved by Hawker-Beechcraft per QTP-00012. **The results obtained using these articles, set-ups, and procedures do not give cause for rejection per QTP-00012.**

Test Program Summary

Six switches (See detail below) were tested per RTCA DO-160 Rev F. Specific test parameters were designed to meet Hawker Beechcraft Corporation (HBC) preferred requirements. The test program was documented in QTP-00012, No Revision. QTP-00012 Rev A contains all 'redline' changes approved during testing, as well as administrative changes to test report formats, Testing began 21 Feb 2011 and concluded on 14 Apr 2011. All testing was conducted at Aerospace Optics, Inc. facilities with the following exceptions.

The Crash Safety (Continuous) test from RTCA DO-160 Rev F, Section 7, was conducted at National Technical Systems (NTS), Plano, TX. This test was performed at the load factors detailed in QTP-00012.

The Radiated Emissions test from RTCA DO-160 Rev F, Section 21 and a portion of the Radiated Susceptibility test from RTCA DO-160 Rev F, Section 20, were also conducted at NTS, Plano, TX. Their report is included as a portion of the Aerospace Optics, Inc. Qualification Test Report, QTR-00012.

For all tests described herein, recorded data was taken from instruments calibrated in accordance with ISO-12000 or ANSI/NCSL Z540-1. Calibration dates were to be recorded and instruments were within current calibration interval.

Description of Test Articles

Aerospace Optics, Inc., produces illuminated push-button switches and indicators for the military and commercial aviation markets. The samples below have various body styles and options, and represent some of the most commonly ordered customer options.

Item	Test Article P/N	Test Article Description
A	LED-DJ-11-HE-E0DA9	**LED illuminated electromechanical pushbutton switch for** Electronic Latching **applications. Logic series 1. Two pole, single break, gold contacts. Unsealed. Single circuit, one common, momentary actuation. Full screen, +28VDC common anode, one input with all four quadrants connected.**
B	LED-54-41-ED-SAAAY	**LED illuminated electromechanical pushbutton switch for** Discrete Dimming **application. Two pole CTS body w/ 18-650 plug. Two pole, double break, silver contacts. Unsealed with EMI shield. Single circuit, one common, momentary actuation. 3-way bottom split screen. +28VDC common anode, three inputs, only top two quadrants coupled.**
C	LR3-DM-11-ED-81168	**LED illuminated electromechanical pushbutton switch for** Pulse/Timer **applications. Compact multi-function body (MFB) with Pulse/Timer circuit. Unsealed. Single circuit, one common, momentary actuation. +28V DC/AC , three inputs, only top two quadrants coupled.**
D	LED-13-11-ED-30508	**LED illuminated electromechanical pushbutton switch. Turret solder terminals. Single pole, double break, silver contacts. Unsealed. Single circuit, one common, momentary actuation. 3-way bottom split screen. +28VDC common anode, three inputs, only top two quadrants coupled.**
E	LR3-44-24-ED-81100	**LED illuminated electromechanical pushbutton switch. Leaded LEDs. Two pole CTS body. Two pole, double break, silver contacts. Drip proof. Single circuit, one common, alternate actuation. 3-way bottom split screen. +28V DC/AC, three inputs, only top two quadrants coupled.**
F	LED-44-24-EU-30508	**LED illuminated electromechanical pushbutton switch. Two pole CTS body. Two pole, double break, silver contacts. Drip proof. Single circuit, one common, alternate actuation. 3-way bottom split screen. +5VDC common anode, three inputs, only top two quadrants coupled.**

Compliance Matrix

Qualification Requirement	Test Requirement	Applicable Test Procedures Document	Applicable Test Reports Document	Test Passed?
Ground Survival Low Temp and Operating Low Temp	**DO-160F 4.5.1, Category F2, Category B2 (sealed units)**	**QTP-00012 (STP-1604.1)**	**QTR-00012 (STR-1604.1)**	**Y**
Ground Survival High Temp Operating High Temp	**DO-160F 4.5.3, Category F2**	**QTP-00012 (STP-1604.2)**	**QTR-00012 (STR-1604.2)**	**Y**
Altitude and Overpressure	**DO-160F 4.6.1, Category F2**	**QTP-00012 (STP-1604.3)**	**QTR-00012 (STR-1604.3)**	**Y**
Temperature Variation	**DO-160F 5, Category C**	**QTP-00012 (STP-1605)**	**QTR-00012 (STR-1605)**	**Y (1)**
Humidity	**DO-160F 6, Category B**	**QTP-00012 (STP-1606)**	**QTR-00012 (STR-1606)**	**Y**
Operational Shock / Crash Safety (Pulse)	**DO-160F 7.2, Category B**	**QTP-00012 (STP-1607.1)**	**QTR-00012 (STR-1607.1)**	**Y**
Crash Safety (Continuous)	**DO-160F 7.3, Category B**	**QTP-00012 (STP-1607.2)**	**QTR-00012 (STR-1607.2)**	**Y**
Vibration	**DO-160F 8, Category R, Category U**	**QTP-00012 (STP-1608)**	**QTR-00012 (STR-1608)**	**Y**
Waterproofness	**DO-160F 10, Category Y (un-sealed), Category R (sealed)**	**QTP-00012 (STP-1610)**	**QTR-00012 (STR-1610)**	**Y**
Salt Fog	**DO-160F 14, Category T**	**QTP-00012 (STP-1614)**	**QTR-00012 (STR-1614)**	**Y**
Magnetic Effect	**DO-160F 15, Category Z**	**QTP-00012 (STP-1615)**	**QTR-00012 (STR-1615)**	**Y**
Power Input Voltage	**DO-160F 16 Category A**	**QTP-00012 (STP-1616)**	**QTR-00012 (STR-1616)**	**Y**
Voltage Spike	**DO-160F 17, Category A (28 V), Category B (5 V)**	**QTP-00012 (STP-1617)**	**QTR-00012 (STR-1617)**	**Y**
Audio Frequency Conducted Susceptibility	**DO-160F 18, Category Z**	**QTP-00012 (STP-1618)**	**QTR-00012 (STR-1618)**	**Y**
Induced Signal Susceptibility	**DO-160F 19, Category CW**	**QTP-00012 (STP-1619)**	**QTR-00012 (STR-1619)**	**Y**
Radio Frequency Susceptibility (Radiated)	**DO-160F 20, Category Y**	**QTP-00012 (STP-1690)**	**QTR-00012 Report by NTS**	**Y**
Radio Frequency Susceptibility (Conducted)	**DO-160F 20, Category Y**	**QTP-00012 (STP-1620)**	**QTR-00012 (STR-1620)**	**Y**
Emission of Radio Frequency Energy (Conducted)	**DO-160F 21, Category P**	**QTP-00012 (STP-1621)**	**QTR-00012 (STR-1621)**	**Y**

Qualification Requirement	Test Requirement	Applicable Test Procedures Document	Applicable Test Reports Document	Test Passed?
Emission of Radio Frequency Energy (Radiated)	**DO-160F 21, Category P**	**QTP-00012 (STP-1690)**	**QTR-00012 Report by NTS**	**Y**
Lightning Induced Transient Susceptibility	**DO-160F 22, Category B3K33**	**QTP-00012 (STP-1622)**	**QTR-00012 (STR-1622)**	**Y**
Electrostatic Discharge	**DO-160F 25**	**QTP-00012 (STP-1625)**	**QTR-00012 (STR-1625)**	**Y**

Notes:

(1) Test requirement was for a rate of temperature change of > 2° C per minute to meet Category C requirement or RTCA DO-160F, Section 5. Test was conducted at > 5° C per minute, exceeding the Category C requirement an meeting the more stringent Category B requirement.

Hawker Beechcraft

Hawker Beechcraft Corporation
P.O. Box 85
Wichita, Kansas
67201-0085 USA

In Reply, Refer to: 940-2011-02350

☒ Action

☐ Info Only

2011-1433
JUL 06 2011

May 18, 2011

FAA Project No: TD5229WI-T
Cert. Project No: 47738-A

Federal Aviation Administration
Mr. Erik Brown, Program Manager
Wichita Aircraft Certification Office
1801 Airport Road, Room 100
Wichita, KS 67209

Subject: Hawker Model 4000 – Qualification Test Report (QTR) for VIVISUN LOGIC Series (Electronic Latching and Pulse / Timer options) and LED Switch With and Without Discrete Dimming

Dear Mr. Brown:

Hawker Beechcraft Corporation (HBC) is submitting QTR-00012: Qualification Test Report (QTR) for VIVISUN LOGIC Series (Electronic Latching and Pulse / Timer options) and LED Switch With and Without Discrete Dimming. Due to the size of this report it is being provided in CD format in lieu of a paper copy. The following data is associated with Certification Plan 4000E360497, Model 4000 Block Point Upgrade A – HI Load 20 Avionics Options/Upgrades.

Document(s):
QTR-00012, Rev N/R (HBC Rev1): VIVISUN LOGIC Series (Electronic Latching and Pulse / Timer options) and LED Switch With and Without Discrete Dimming

(2) FAA Form(s) 8110-3

DER(s):	Approved	Recommended
John L. Wiginton, DERT-230135-CE,; Systems & Equipment (EE)	X	
Howard S. Jordan Jr., DERY-230552-CE; HIRF/Lightning	X	

Contact:
John Dicken 676-0077

Sincerely,

HAWKER BEECHCRAFT CORPORATION

Randolph Shields, Director of Safety and Certification

RS: sss

Enclosures (CD)

THE FAA WICHITA AIRCRAFT CERTIFICATION OFFICE, ACE-115W, ACKNOWLEDGES RECEIPT AND
☒ ACCEPTS THE APPROVAL
☐ CONCURS WITH THE RECOMMENDATION
☐ ACCEPTS THE CERTIFICATION PLAN
☐ FOR COMMENTS SEE FAA LETTER DATED _____
THIS DATA HAS BEEN ADDED TO OUR FILE

116W - Mechanical	DATE	116W - Propulsion	DATE
117W - Flt Analyst	DATE	117W - Flt Test Pilot	DATE 6/30/11
118W - Airframe	DATE	119W - Elect / Avionics	DATE