VALIDATION TESTING & COMPETITIVE ANALYSIS LAB GROUP

PRESSURE TRANSDUCER 12-635-004

REPORT NO : P255-5018-1
DATE : 12/10/2015
REVISION : 1

TITLE:	INITIAL PARAMETRIC TEST
PROJECT NO:	P255-5018-1
CUSTOMER:	CIRRUS AIRCRAFT
CUSTOMER P/N:	12-635-004 / G1014
SPECIFICATION:	TEST PLAN P255-5018
TESTED BY:	JOHN WONG
REPORT PREPARED BY:	JALPEN PATEL
REVIEWED BY:	MARCOS NASSAR

1. VISUAL INSPECTION

Kavlico Corporation performed functional validation test on pressure transducer 12-635-004 according to the test plan P255-5018 (Appendix I). Test was started beginning with opening a taped box in presence of Aviation Safety Inspector Mr. Bruce A. Borden.

Fig. 1: Taped box of sensor at the beginning

Pressure transducer was visually inspected for any defect or damage and following was confirmed.

- No damage on outer appearance of the sensor.
- No damage on connector and no signs of fretting on pins.
- Confirmed pressure port is not clogged or damaged.

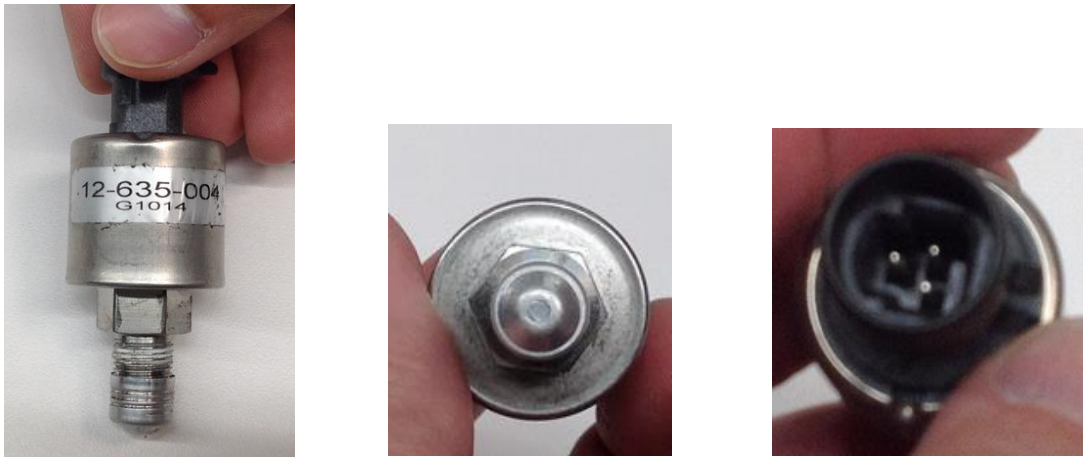

Fig. 2: Pictures from visual inspection

2. X-RAY INSPECTION

Pressure transducer was examined under X-rays for further details of inside. X-rays shows details of flex wire connecting electric board and connector. From images no loose contact or damage found inside of the sensor.

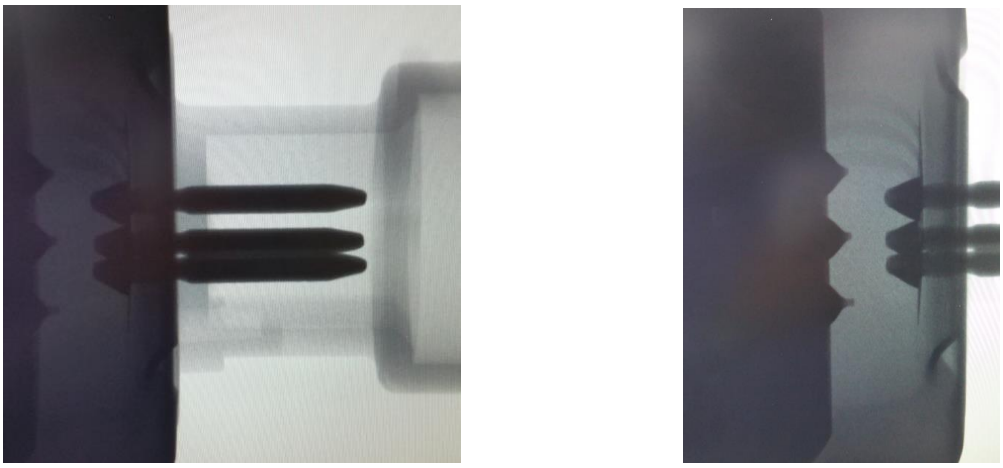

Fig. 3: X-Ray Images

3. BENCH TEST

Bench test was performed where pressure truanducer was powered up with 5 VDC supply. Also it was mounted on pressure manifold to apply full pressure of 150 PSIG at ambient temperature. From this it was confirmed that transduser reads correct pressure and provide output well within specified range. Also tranducer was tapped with mallet and observed that there was no loose contact or output shift because of the impact.

Pressure	Output
PSIG	VDC
0	0.49186
75	2.5058
150	4.5192

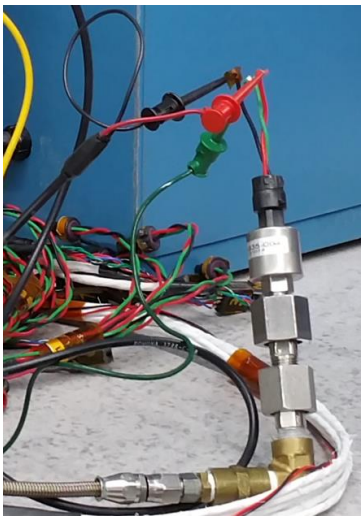

Fig. 4: Set up for Bench test

4. PARAMETRIC TEST

Kavlico Corporation performed parametric test on Pressure Transducers 12-635-004 to verify functionality during specified temperature range. It was confirmed from the test that pressure transducer is not functional and failed to provide the correct output at 100 °C.

a. TEST CONDITIONS

Barometric Pressure:	14.5 ± 0.4 PSIA
Relative Humidity:	50% ± 30%
Room Temperature:	25 ± 5°C
Supply Voltage	5.0 ± 0.05 VDC
Parametric Test Pressure Range:	0 To 150 PSID
Parametric Test Temperature Range:	-30.0°C to 100.0°C

Note: All temperatures were held within ±2°C with the exception of tests performed at room temperature.

b. TEST EQUIPMENT

Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with KP 1026, by KAVLICO, Inc., utilizing reference standards whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All Referenced standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment is supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

c. AUTOMATIC TEST EQUIPMENT

TEST EQUIPMENT DESCRIPTION	MANUFACTURER	MODEL NO	CALIBRATION DUE
TEMPERATURE CHAMBER	THERMOTRON	S-8C/S-8-3800	1/22/16
DATA ACQUISITION	AGILENT	34970	1/29/16
PROGRAMMABLE POWER SUPPLY	AGILENT	E3631A	8/15/16
PRESSURE CONTROLLER	DRUCK	DPI 510	12/2/16

d. SETUP FOR PARAMETRIC TEST

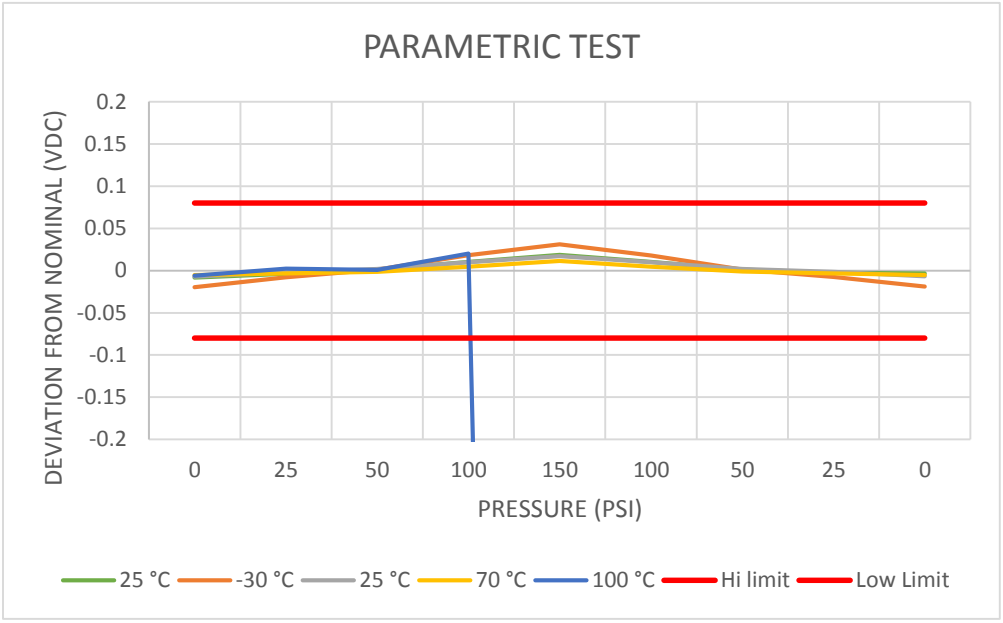

Fig. 5: Parametric test

VDC	0	25	50	100	150	100	50	25	0
25 °C	0.491791	1.163007	1.834687	3.176987	4.518486	3.177103	1.834609	1.163964	0.496521
-30 °C	0.48037	1.158935	1.834545	3.184833	4.530999	3.184601	1.834519	1.158987	0.480988
25 °C	0.492883	1.164493	1.83523	3.176638	4.517271	3.176702	1.835281	1.165101	0.493337
70 °C	0.49482	1.163253	1.831804	3.171428	4.511531	3.171441	1.832153	1.163408	0.494629
100 °C	0.493902	1.169035	1.83422	3.186638	-0.00035	-0.00059	-0.00099	-0.00071	-0.00065
Hi limit	0.58	1.25	1.91	3.25	4.58	3.25	1.91	1.25	0.58
Low Limit	0.42	1.09	1.75	3.09	4.42	3.09	1.75	1.09	0.42

5. CONCLUSION

Kavlico Corporation performed validation tests on Pressure Transducers 12-635-004 and confirmed failure at 100 °C temperature while running full parametric test. Further testing under vibration was not required, since failure was confirmed. A tear-down analysis will be needed to determine root cause of the failure.

VALIDATION PLAN & REPORT

DVP NUMBER:			
PLAN DATE		PLAN ORIGINATOR:	Jalpen Patel
COMPONENT/ASSEMBLY: P255-5018	SPECIFICATION: Per P255-5018-DWG	CONCURRENCE	MANAGER APPROVAL: Marcos Nassar
MY: Oct, 2015	APPLICATIONS: Oil Pressure	SOURCE: Kavlico Corp	REPORT DATE	REPORTING ENGINEER: Jalpen Patel

TEST PLAN / TEST REPORT

ITEM NO.	PROCEDURE OR STANDARD	TEST DESCRIPTION	ACCEPTANCE CRITERIA	TARGET REQ'MENT	TEST RESP.	TEST STAGE	SAMPLE QTY	SAMPLE TYPE	TIMING START	TIMING COMPL	SAMPLES TESTED QTY	SAMPLES TESTED TYPE	SAMPLES TESTED PHASE	ACTUAL RESULTS	NOTES
1	Visual Inspection	- Check outer appearance of the sensor. - Inspect connector and check pins for signs of fretting. - Confirm pressure port is not clogged or damaged. - Take pictures of the sensor from different views.			Kavlico	CC	1	E	12/8/15	12/8/15	1	E		PASS	
2	X-Ray Inspection	- Use X-Ray to inspect internal components. - Check condition of pressure port.			Kavlico	CC	1	E	12/8/15	12/8/15	1	E		PASS	
3	Bench test	- Power up the sensor and read the output at ambient pressure. - Tap sensor to look for any output shift.	P255-5018-DWG Rev B	No Failures	Kavlico	CC	1	E	12/8/15	12/8/15	1	E		PASS	
4	Parametric Test	Test Pressures (gage) in % of full scale: 0, 25, 50, 100 150, 100, 50, 25, 0 Test Temperatures in °C: -30, 25, 70,100 45 min soak time at each temperature	Output voltage to remain within total error band per drawing P255-5018-DWG	No Failures	Kavlico	CC	1	E	12/8/15	12/8/15	1	E		FAIL	FAILED @ 100°C, NO FURTHER TESTING REQUIRED
5	Vibration Test	Random vibration levels: 50 Hz / 0.014 (g^2/Hz), 90 Hz / 0.004 (g^2/Hz), 150 Hz / 0.0025 (g^2/Hz), 300 Hz / 0.0035 (g^2/Hz), 5000 Hz / 0.008 (g^2/Hz), 800 Hz / 0.02 (g^2/Hz), 2000 Hz / 0.02 (g^2/Hz) GRMS: 5.49 One Axis mount, test at Room Temperature. Test duration 1 Hr, Monitor output continuously @null pressure.	Output voltage to remain 0.5 ± 0.06 V	No Failures	Kavlico	CC	1	E	-	-	-	-	-	N/A	

DEFINITION OF ABBREVIATIONS:

TEST STAGE
EV=Engrg. Validation
DV=Design Validation
PV= Prod. Validation
CC=Continuing Conformance

SAMPLE TYPE
A=Prototype (hand made)
B=Prototype (tooled)
C=Program level
D=Initial production
E=Full volume production

PHASE
Corresponds to program phase per CP1010