

Instruction Manual Sensor Simulator & Tester

Introduction

The Sensor Simulator & Tester is designed to aid in the debugging of temperature probes and other sensors used to measure critical parameters in aircraft systems. It has four modes of operation Generate, Millivolt meter, Ohm Meter and Resistance substitution.

In the Generate mode a stable voltage that can be adjusted from 7-70 millivolts appears on the terminals. This is used to test the temperature probe system for continuity. An accurate digital LCD voltmeter indicates the voltage at the terminals.

The Millivolt meter mode removes the voltage source from the terminals but leaves the accurate LCD milli-voltmeter connected. This mode can be used to measure the output voltage from a heated probe.

In Ohmmeter mode the SST becomes an accurate ohmmeter for resistance values from .2 to 199 ohms and is particularly useful for measuring the resistance of thermocouple or variable resistance temperature probes or fuel gauge senders.

The Resistor substitution mode turns the SST into a one-half watt resistor substitution box with a special position, 28.5 ohms, for the older oil temperature probes and other resistances from 50 to 600 ohms in 50-ohm increments. Note that the SST can be turned off in this mode, as none of the internal active electronic components are needed.

Battery Charging

The battery should be charged for 24 hours before using the SST charger. The charger may be left connected without damaging the batteries.

Thermocouple Probe Testing

System Test

The first test of a suspect probe channel should be the system test. Place the Simulator/Tester in the Generate Mode. For J and K probes, break the connection at the Red wire and connect the positive output of the tester, Yellow post, to the probe side of the wire and the negative side, Black post, to the lead going into the meter in the cabin. For K probes set the voltage to 33-36 millivolts, mV, for a meter reading of about 1500 degrees F. For J probes, set the voltage to read 7.5-8.5 mV for a meter reading of 350 degrees F.

If the temperature gauge reading is zero, remove the other probe connection and connect the other lead going into the cabin to the Black terminal on the tester. The temperature gauge should read about 1500 degrees for a K probe with a 33-36 mV setting or 350 degrees for a J probe with a 7.5-8.5 mV setting. If the meter reads properly, the probe has probably failed.

Probe Test

The first test of the probe can be done in place. Set the SST to Ohmmeter mode and measure the resistance of the probes, 0.2 to 0.3 ohm for J probes and 0.6 to 1.0 ohm for K probes.

The second way to test a probe is to place the SST in the Milli-voltmeter mode. Connect the probe to the Simulator Tester observing the color code, Yellow or White is positive and Red is always negative. Heat a J probe with a heat gun and observe the voltage generated on the meter. To check the calibration you can place the probe in boiling water, 212 degrees, the meter

should read approximately 3.8 mV. Heat a K probe with a propane torch until it glows red, the meter should read approximately 30 mV. Please use proper precautions when heating with the torch such as safety glasses, gloves and have a fire extinguisher nearby.

The output voltages for J and K probes for various input voltages are listed in the table below.

Type J	Ref Temp 75F	Type K	Ref Temp 75F
Degrees F	Probe mV	Degrees F	Probe mV
100	0.72	1000	21.31
150	2.19	1050	22.49
200	3.69	1100	23.68
250	5.20	1150	24.86
300	6.72	1200	26.03
350	8.26	1250	27.20
400	9.81	1300	28.37
450	11.64	1350	29.54
500	12.90	1400	30.70
550	14.43	1450	31.85
600	15.96	1500	32.98
650	17.50	1550	34.12
700	19.04	1600	35.24
		1650	36.36
		1700	37.48
		1750	35.58
		1800	39.67

Resistive Probes and Senders

Resistive probes and sensors are found in most fuel gauge senders and older Oil temperature probes. Since the failure could be either the sensor or the gauge, start at the point where the leads are easily accessible. Break both leads and connect the SST in Resistor substitution mode (For resistance oil temperature sensors, use the Oil position on the mode switch) and connect the SST to the meter. Power the system and check that the gauge is reading correctly for the resistance set. If the meter reading is correct, set the SST in Ohmmeter mode and measure the resistance of the Probe/Sensor. Other senders such as fuel gauges have resistance values around 200 ohms.

Repair and Calibration

QC Avionix offers repair and calibration services all our products. Please email or call the factory for charges.