SCIENTIFIC INSTRUMENTS

COMPONENT MAINTENANCE MANUAL
B7030

DESCRIPTION AND OPERATION

1. DESCRIPTION

The Cockpit Rate-of-Change/High-Limit Temperature Sensor is a dual-function unit in that it furnishes both rate-of-change and high-limit sensing. In addition, a built-in thermal lag provides for dampened response in the rate-of-change circuit.

Physically, the unit consists of three sensing element groups comprised of a number of calibrated thermistors. These thermistors are terminated on a 6-pin hermetically sealed, bayonet/coupling receptacle, which connects to an external temperature control system. Mounting of the unit in the aircraft is accomplished via an external -7/8-14 threaded section and hex head configuration as illustrated in Figure 1.

2. OPERATION

Two of the thermistors furnish rate-of-change data. One of these is thermally impeded by virtue of the fact that is located within an inner cavity. The other rate-of-change thermistor is exposed to the ambient temperature by four slots, which are equally spaced around the body of the probe.

High-limit temperature sensing is furnished via two thermistors wired in series. Like the exposed rate-of-change thermistor, these are exposed to the ambient temperature by four slots mentioned previously.

The thermistor-to-receptacle connections are as illustrated in Figure 1.

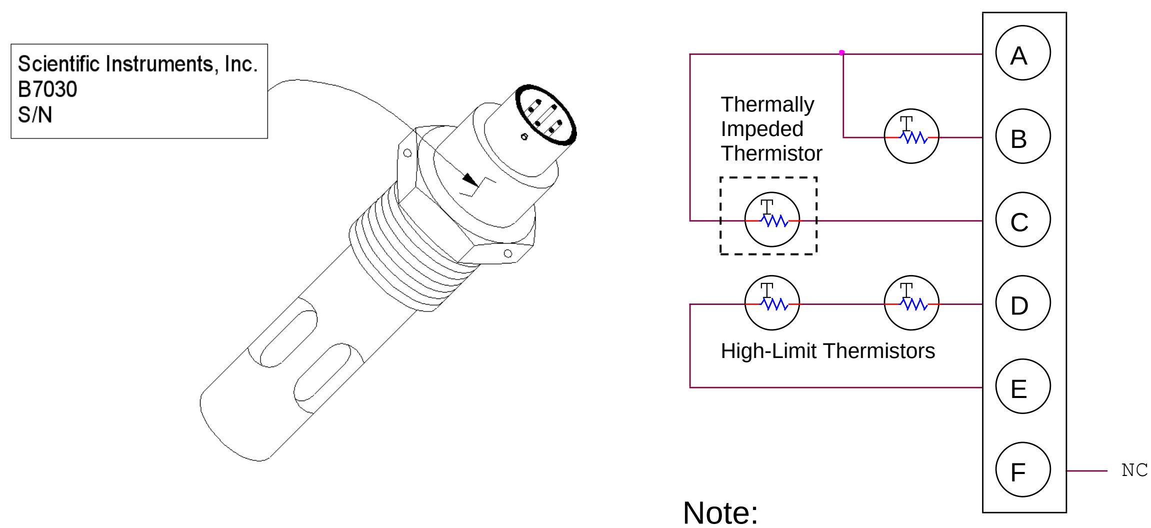
3. SPECIFICATIONS

Operating Ambient Temperature Range	-65 °F to +160 °F (-54 °C to +71 °C)
Nominal Sensor Resistance	
a) Rate-of-Change	2037 ± 61 ohms @ 110 °F (43 °C)
b) High-Limit Elements	7430 ±223 ohms @ 110 °F (43 °C)
Receptacle	MS3113H106P (or equivalent per MIL-C-26482)
*Mating Bayonet Plug	MS3116E106S

Size:

Probe Diameter:	.692 in. (17.58 mm)
Overall Length	3.75 in. (95.25 mm) maximum
Mounting Thread:	7/8 – 14 UNF – 3A
Mounting Hexagon:	1.06 in. (26.92 mm) (NOM)

∗ This plug is listed for test purposes only, and is not necessarily used on the aircraft.



Note:
Pins A & C are thermally impeded

Outline and Schematic Drawing
Figure 1

TESTING AND FAULT ISOLATION

4. TESTING AND FAULT ISOLATION

A. The data that follows permits the testing of the sensor to insure correct operation.

B. Special Tools and Test Equipment:

1) A megohmeter capable of reading 5 megohms and greater at 500 VDC (AEMC Model 1000, or equivalent)

2) Temperature-controlled environmental test chamber. Accuracy 1%.

3) Thermometer with temperature accuracy ± 0.2°F (± 0.11°C)

4) Ohmmeter with:

   Current: <0.1 mA

   Accuracy: 0.05%

   Range: 0-100 KΣ

C. Visual Check

   1) Visually check the sensor for obvious damage.

D. Insulation Resistance

   1) Using the megohmmeter, measure the resistance between all pins and the housing. The readings should exceed 5 megohms at 500 VDC.

E. Electrical Test

   1) Connect the Ohmmeter to pins A & B of the temperature sensor. Hold the sensor at a temperature of 77°F ± 3°F (25°C ± 1.8°C), within the environmental test chamber. With the thermometer at a stable temperature and located within approximately 1/2 in. (12.7 mm) of the tip of the sensor, measure the temperature. Compare this value to that indicated on Figure 3. The value must be within the limits shown on the drawing.

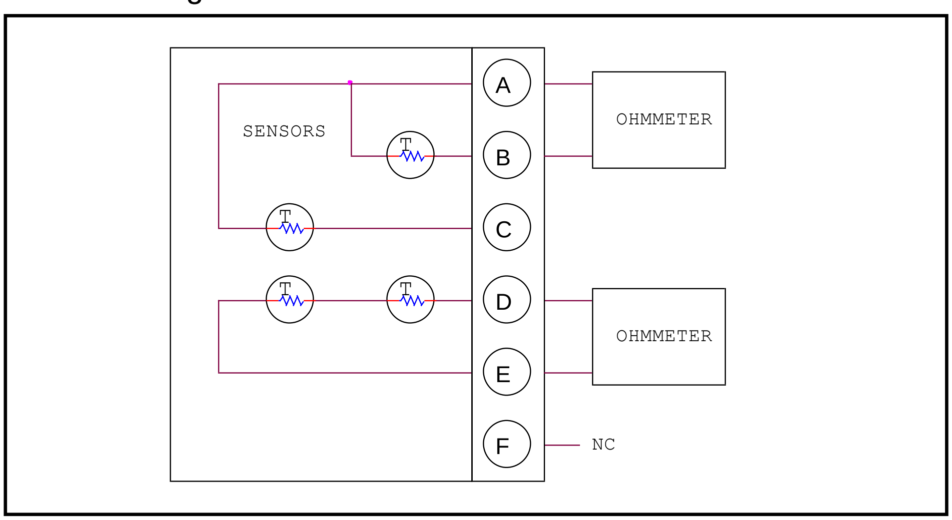
   2) Connect the Ohmmeter to pins A & C of the temperature sensor. Hold the sensor at a temperature of 77°F ± 3°F (25°C ± 1.8°C), within the

environmental test chamber. With the thermometer at a stable temperature and located within approximately 1/2 in. (12.7 mm) of the tip of the sensor, measure the temperature. Compare this value to that indicated on Figure 3. The value must be within the limits shown on the drawing.

3) Increase the temperature of the test chamber to 110°F F ± 3°F (43.3°C ± 1.8°C), within the environmental test chamber. Retest pins A & B and A & C. Compare this value to that indicated on Figure 4. The value must be within the limits shown on the drawing.

4) Connect the Ohmmeter to pins D & E of the temperature sensor. Hold the sensor at a temperature of 110°F ± 3°F (43.3°C ± 1.8°C), within the environmental test chamber. With the thermometer at a stable temperature and located within approximately 1/2 in. (12.7 mm) of the tip of the sensor, measure the temperature. Compare this value to that indicated on Figure 5. The value must be within the limits shown on the drawing.

5) Increase the temperature of the test chamber to 145°F ± 3°F (62.8°C ± 1.8°C), within the environmental test chamber. With the thermometer at a stable temperature and located within approximately 1/2 in. (12.7 mm) of the tip of the sensor, measure the temperature. Compare this value to that indicated on Figure 6. The value must be within the limits shown on the drawing.



Schematic for Electrical Test

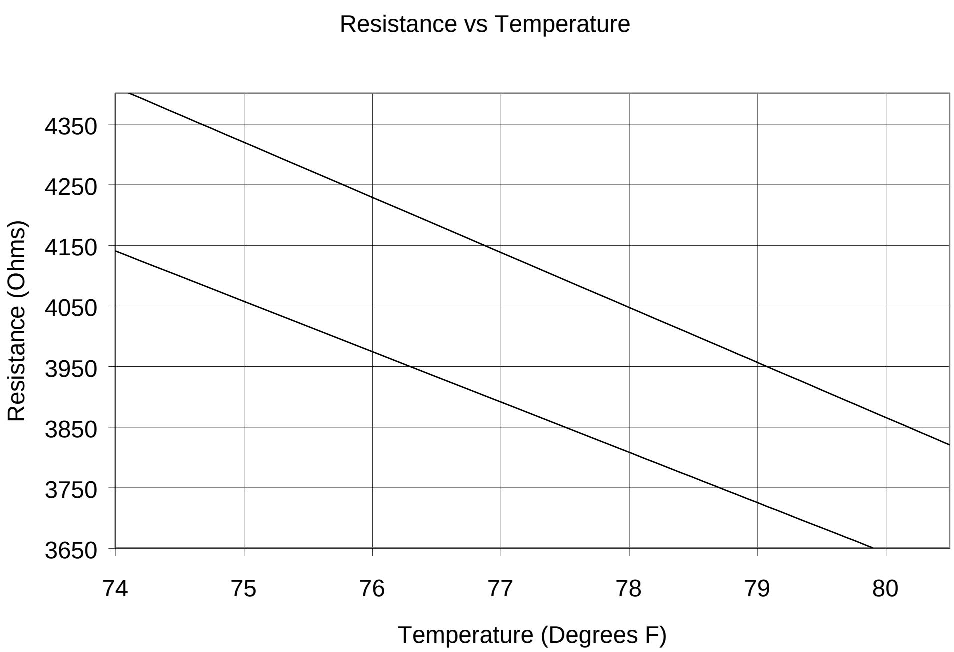
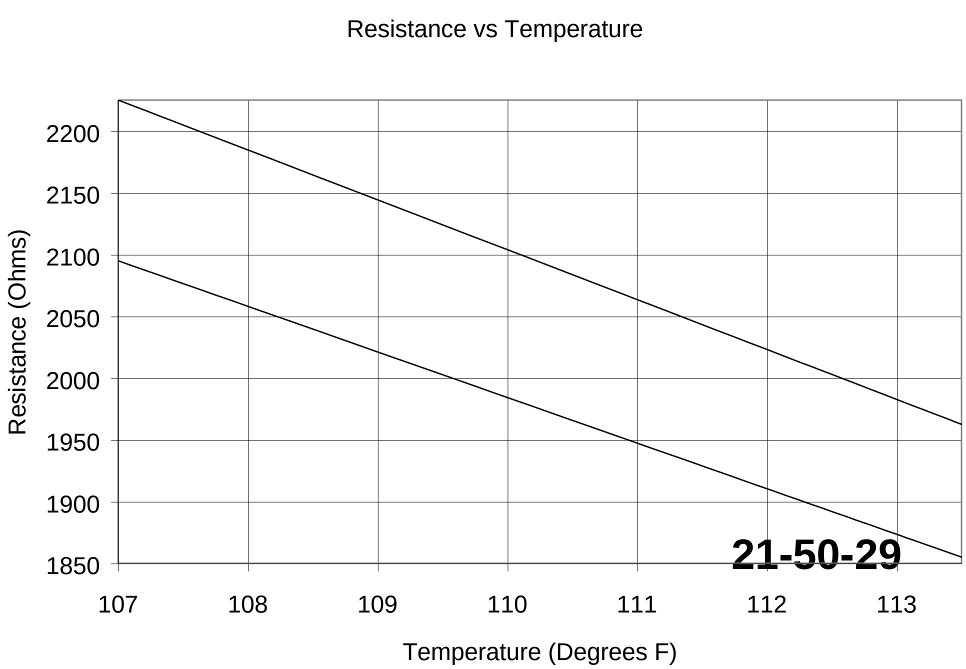


Figure 2
Resistance vs Temperature
Figure 3
Resistance vs Temperature



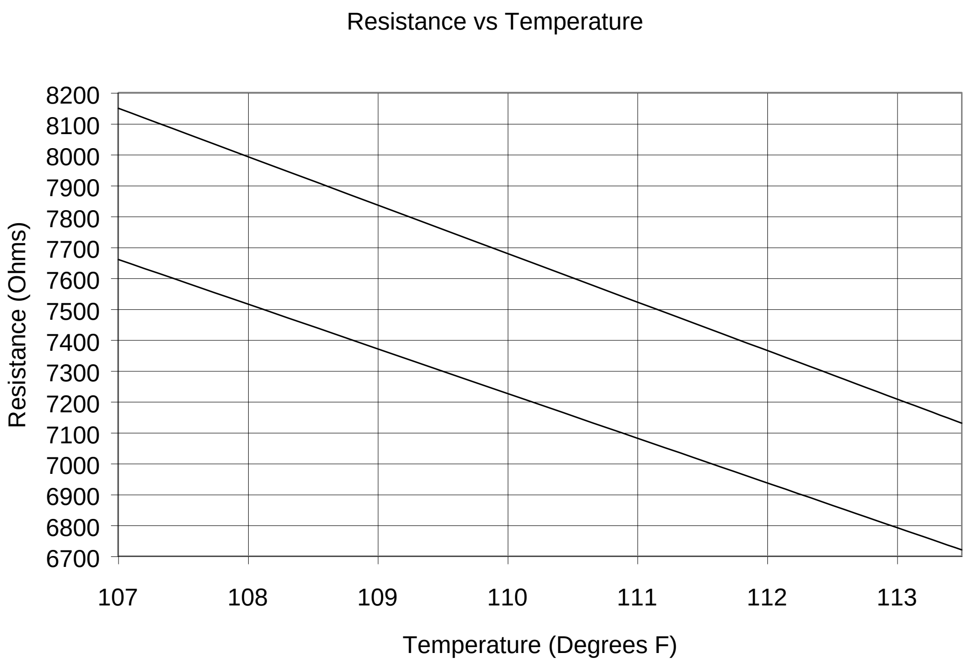
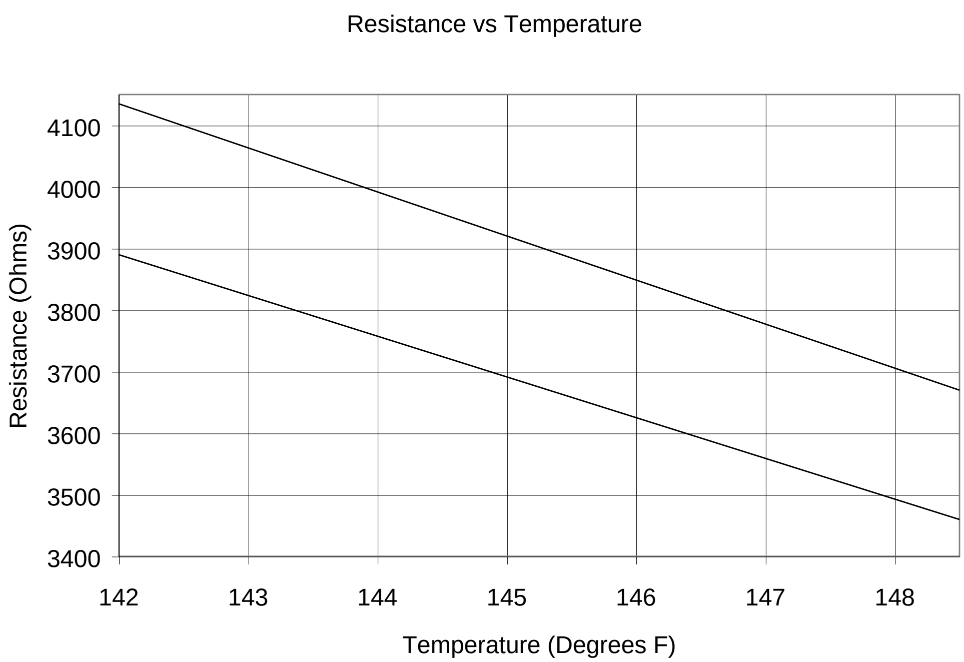


Figure 4
Resistance vs Temperature
Figure 5



Resistance vs Temperature
Figure 6

5. DISASSEMBLY

NOT APPLICABLE

6. CLEANING

A. Remove dirt, stains, moisture, etc. with a clean, dry, lint-free cloth.

B. Use a soft bristle brush moistened in isopropyl alcohol to remove any foreign matter from between the receptacle pins.

7. CHECK

A. Visually inspect the sensor probe for obvious wear or damage.

B. Check for bent, broken or missing receptacle pins.

C. Check probe housing for scratches or cracks.

8. REPAIR

The temperature sensor is considered non-repairable. Bent receptacle pins may be carefully straightened. For other defects or incorrect operation, the temperature sensor should be discarded.

9. ASSEMBLY INCLUDING STORAGE

A. Assembly

Not Applicable

B. Storage

(1) Install a protective cap on the electrical connector.

(2) The sensor must be stored in a clean and dry room open to the air. The temperature must be between 64°F and 82°F (18°C and 28°C) and the relative humidity between 25% and 65%.

(3) Keep the sensor in its initial packaging. If other containers are put on the sensor container, be careful to prevent damage caused by too much weight.

(4) Do not keep the sensor near heat, fluids or other sources that can cause corrosion.

10. FITS AND CLEARANCES

No dimensional check of the sensor is necessary.

11. SPECIAL TOOLS, FIXTURES AND EQUIPMENT

No other special tools are necessary.

12. ILLUSTRATED PARTS LIST

Since the unit is non-repairable, no parts list is provided.