November 1970

Brief 70-10461

NASA TECH BRIEF

Very Low Velocity Flow Sensor Uses Fluidic Techniques

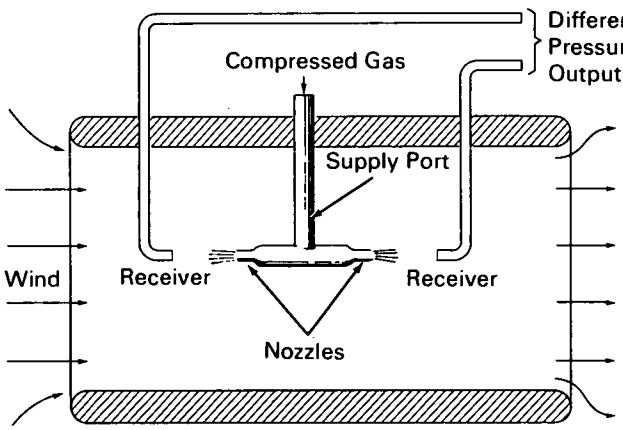

Figure 1. Parallel Flow Wind Sensor

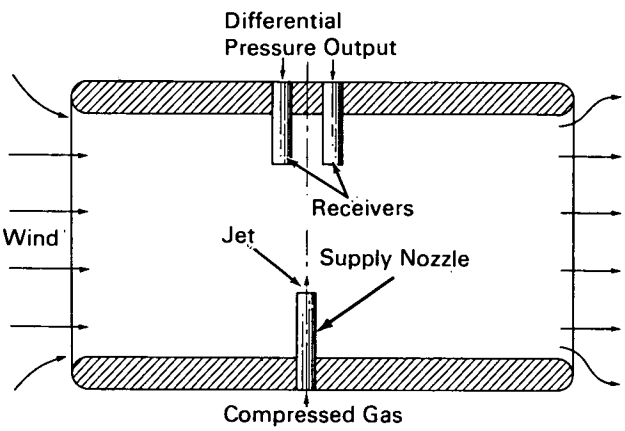

Figure 2. Cross-Flow Sensor Configuration

Two designs for a versatile low velocity flow sensor have been developed that have important potential applications in V/STOL aircraft, wind tunnel instrumentation, meteorology, and gas flow measurement in hazardous atmospheres.

The parallel-flow configuration, shown in Figure 1, provides a differential pressure output as the wind velocity varies. Gas from the supply port expands through twin nozzles and, in the absence of wind, generates equal pressures in the receivers. When the wind flows past the sensor, the downwind jet pressure increases; simultaneously, the upwind pressure decreases. The output of this sensor is nearly linear and relatively insensitive to supply pressure over a wide range of wind velocities. The differential output pressure varies from 0 to 0.3 psi per psig of supply pressure as the wind velocity varies from 0 to 90 ft/sec.

Figure 2 shows the basic design of a cross-flow sensor. Gas expands through a supply nozzle to form a jet. Two receivers sense the position of the jet, and their output pressures change as the cross-wind deflects the jet. The difference in output pressures of the two receivers is related to the wind velocity by a characteristic square-law calibration curve which saturates as the wind speed approaches a critical velocity. If the outputs of the cross-flow sensor are input to a fluidic operational amplifier, high pressure output may be obtained for low wind velocities without changing the output characteristic. In an actual test of this configuration, wind velocities from 1 to 14 ft/sec varied the output pressure from the fluidic amplifier over its full range (6 to 13 psig).

Notes:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

(continued overleaf)

Reference:
NASA-CR-86352 (N70-26580), Fluidic Low Speed Wind Sensor Research Study

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: R.F. Turek of
Bowles Engineering Corp.
under contract to
Electronics Research Center
(ERC-10404)