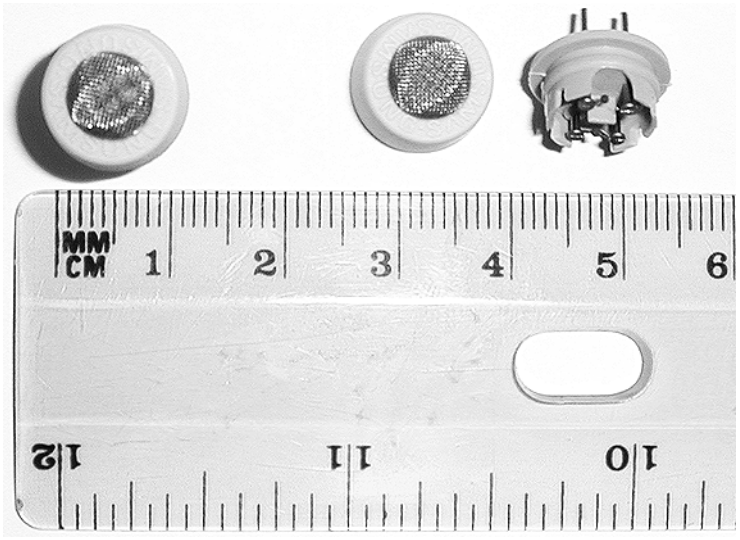
DETECTORS
Catalytic Combustion Detector - CCD

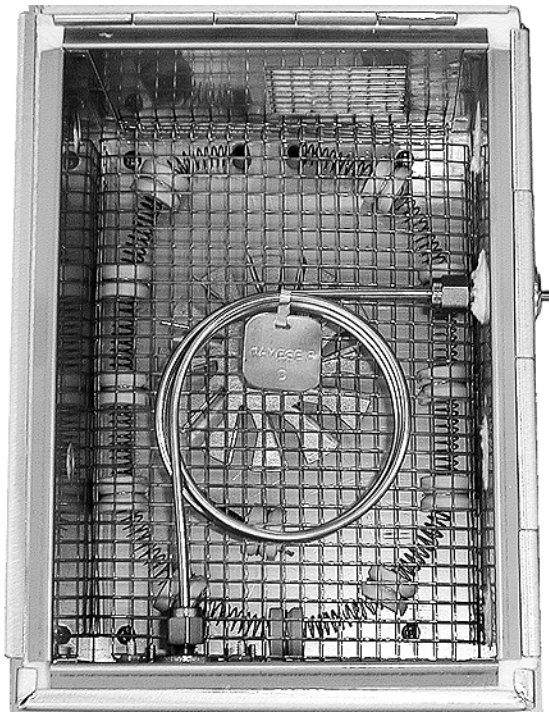
Overview

CCD on Column Oven



CCD Detector and protective cap (cap is removed prior to installation)

The Catalytic Combustion Detector responds to all hydrocarbons with the selectivity of an FID and the sensitivity of a TCD. The entire detector's diameter is merely one centimeter. Its sensor element consists of a tiny coil of platinum wire embedded in a catalytic ceramic bead. Each CCD detector has a pair of sensor elements. The sensors are housed in high-grade, flame-proof nylon, and protectively capped with a fine steel mesh. In SRI GCs, the CCD detector is mounted on the wall of the Column Oven in a brass housing, as shown in the top left picture. The analytical column residing in the Column Oven is connected to the detector through the oven wall; the example shown at bottom left is an SRI Gas-less™ Educational GC featuring a CCD detector and a 1m (3') Hayesep-D packed column. The CCD detector is especially suited for gas-less operation because it can operate on ambient air, requiring no high pressure cylinder gases such as hydrogen or helium. In the GC system pictured at left, a built-in air compressor supplies the carrier gas for the CCD.

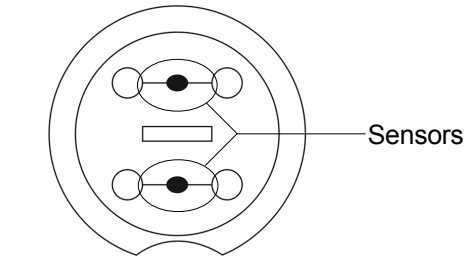


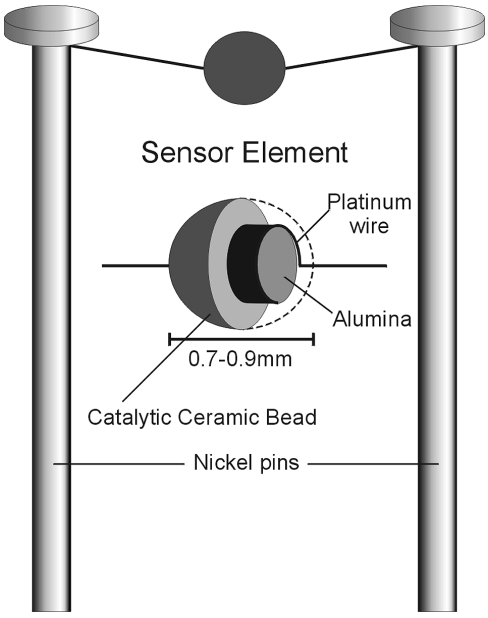
The CCD detector can also be used as a hydrocarbon monitor in non-chromatographic applications where the CCD senses the total hydrocarbon content of a flowing air stream, or as a hydrogen/hydrocarbon leak detector.

DETECTORS
Catalytic Combustion Detector - CCD

Theory of Operation

Top View of CCD Detector

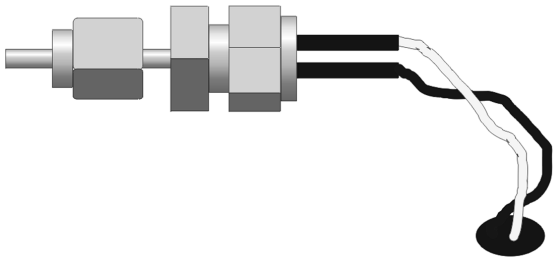


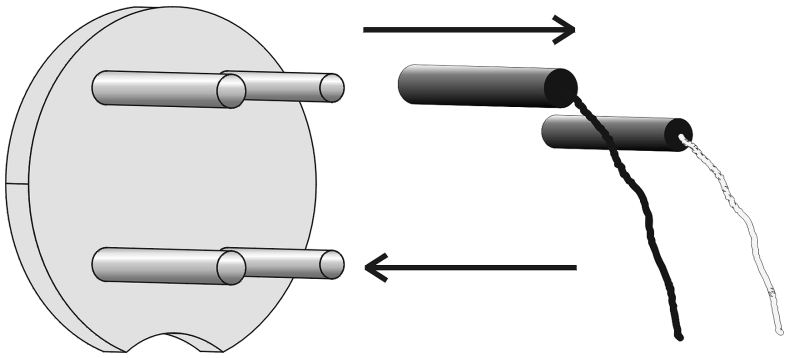


Side View of Sensor Element

The CCD sensor elements are the tiniest and most important part of the detector. Each CCD detector contains two sensor elements, but uses only one at a time. A catalytic combustion sensor consists of a coil of platinum wire around an alumina core surrounded by noble metal catalysts. Each sensor is suspended between a pair of nickel pins. The detector is shipped with a protective nylon cap topped with steel mesh, but is installed on a SRI GC without it. During a chromatogaphic run, a 150 milliamp current heats the catalytic ceramic bead to around 500°C, hot enough to combust hydrocarbon molecules on contact. The CCD is maintained in an oxidative environment by using air as the carrier or make-up gas. This combustion causes the increase in temperature and change in resistance that is measured by the sensor. This change in resistance causes the CCD detector output to change, which produces a peak that is recorded by the PeakSimple data system.

To prolong the life of your CCD detector, use it in strict accordance with your GC system's operating instructions. For instance, if you have an SRI Mud-Logger GC, you should connect your sample streams at 10psi so that no more than 5mL/min of pure hydrcarbon flow reaches the CCD. In the event of a sensor burn-out, simply remove the white and black wires from the top two nickel pins, and move them to the bottom pair of nickel pins to connect them to the second sensor. It does not matter which wire goes on which pin. To replace the CCD detector, unscrew its brass fitting after removing the wires from the nickel pins. Pull out the old one and remove the protective cap from the replacement. Sensor-side first, insert the replacement into the fitting with its half-moon shaped cut-out on the bottom. Replace the fitting and HAND TIGHTEN it. If the detector fitting is screwed on too tightly, the detector will not receive proper gas flow. Next, slip the black and white wire plugs over the pins, and your replacement CCD detector is ready to use.





Expected Performance

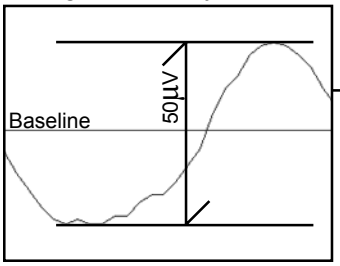
CCD Detector Noise Run

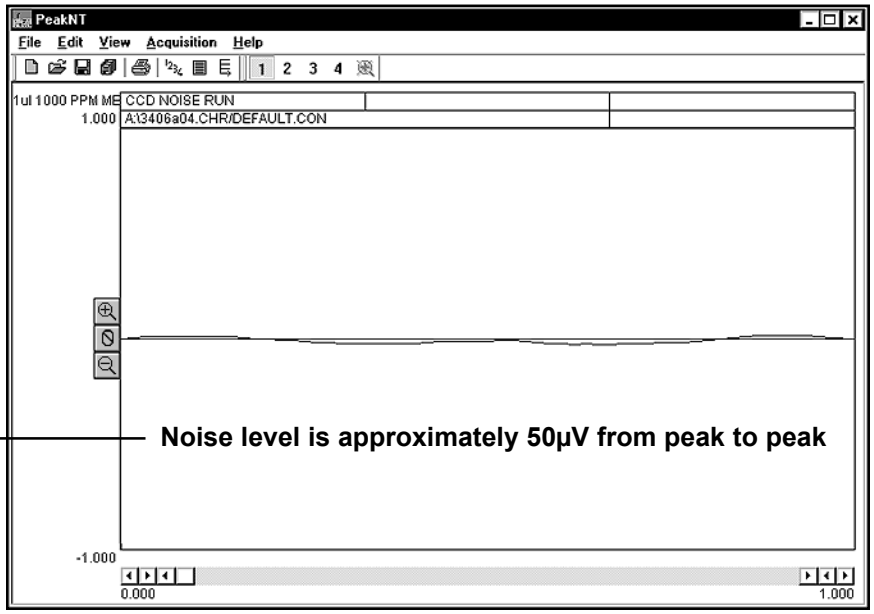
Column = 1m Hayesep D
Flow = 37mL/min

Isothermal Temperature Program:

Initial	Hold	Ramp	Final
80°C	15.00	0.00	80°C

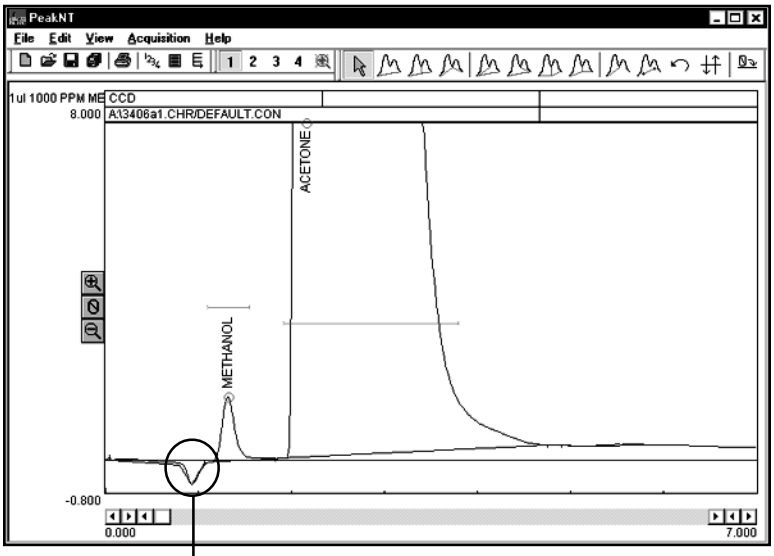
Enlarged for clarity





Noise level is approximately 50µV from peak to peak

Factory Test Run of a Gas-less™ Educational GC System



Negative water peak

Column = 1m Hayesep D
Flow = 37mL/min
Sample = 1µL 1000ppm Methanol/Acetone mix; direct injection

Isothermal Temperature Program:

Initial Temp	Hold	Ramp	Final Temp
130°C	10.00	0.00	130°C

RESULTS:

Component	Retention	Area
Methanol	0.816	13.2030
Acetone	2.000	6945.3570
	Total	6958.5600