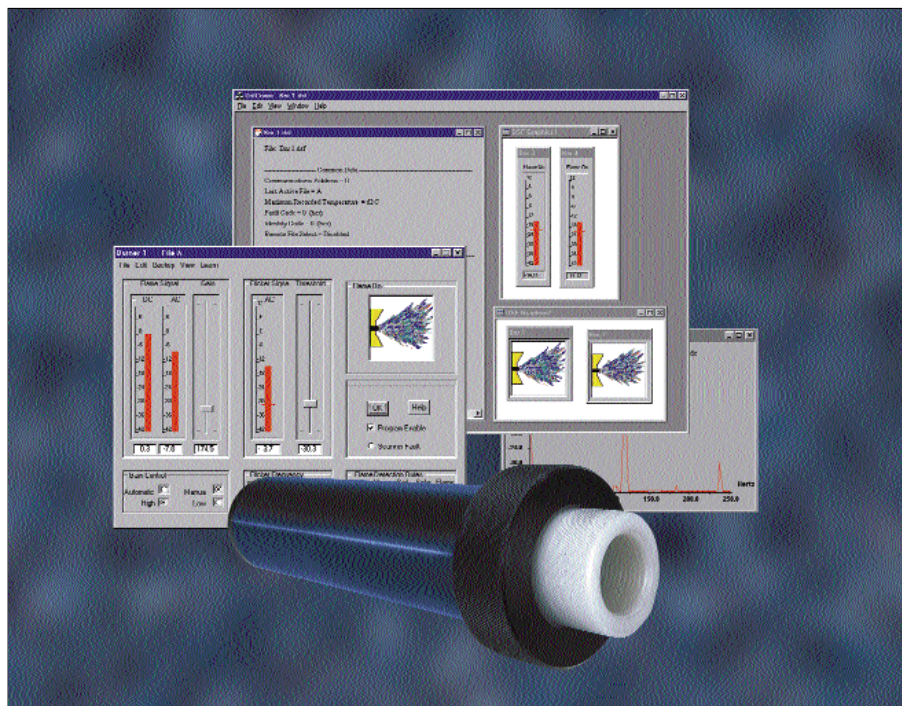


## COEN Revolutionizes Flame Scanner Industry With New On-Screen Technology



- Eliminates lights, pushbuttons, meters and other hardware of conventional scanner systems
- Eliminates stand-alone signal processor

### The Burner Display

- On-screen adjustments save set-up time
- Self-learning adjustments for sensitivity, flicker frequency, and threshold
- Gain and threshold limits easily adjusted on screen for each burner
- Flame and flicker frequency burner status shown for each burner
- Flame-on icon readily visible

Coen's team of combustion experts is at it again—this time with a revolutionary scanner technology that simplifies operations and provides tremendous cost savings.

Our latest design, the *iScan*, substantially cuts installation time with the use of powerful but user-friendly PC-based software. It also integrates the scanner and signal processor into one package, providing the following cost saving benefits:

- Expensive control cabinet hardware eliminated
- System wiring minimized
- Extensive technician training unnecessary
- Easy installation reduces commissioning time

### The System Display

- Handles any number of burners
- Provides information on scanner history and current status instantly

**The microprocessor-based design, Windows-based software, and on-screen displays make the new *iScan* very user-friendly. System status, individual burner status, and flame signal data are always at your fingertips.**

- Automatic gain adjustment available
  - Flame status display
  - Complete history of flame characteristics
  - Easily adjusts flame response for each fuel
  - Easily discriminates one flame from others
  - Flame deterioration seen ahead of time
- And as guaranteed with any Coen product, the *iScan* is built to be durable and reliable.**
- Solid state detector
  - Reliable self-checking of circuit response
  - Compact design installs easily
  - Lightweight design stays aligned
  - No moving parts, low maintenance
  - NEMA 4 or explosion-proof housing



# History of Scanners

In the early 1900s, operators controlled boiler flames by periodic inspection. In the mid-1900s, a tremendous increase in boiler construction and demand for variable steam increased burner light-offs and shutdowns, resulting in a substantial increase of boiler explosions.

Insurance companies realized that periodic visual flame inspection was unsafe. Most

The UV tube flame detector had two major problems. One, it could fail in “flame on” mode, defeating its purpose. Second, UV radiation could be absorbed by moisture and recirculating gases, making it useful only for gas fired units.

The second optical detector, a lead sulfide (PbS) cell, was introduced in 1960 to detect infrared radiation produced by oil and coal

developed in 1991 with adjustable flicker frequency in one unit to sense all fuels.

All of these advanced flame detectors still used analog signal processing which did not provide a visual indication of configuration. Adjustments were made with screwdrivers and potentiometers. The need for a digital based detector with a user-friendly setup procedure became a driving force, and the latest microprocessors made fast digital signal processing for flame detection possible.

## Coen Scanners

SCANNER	WAVELENGTH (NANOMETERS)			FUELS	INTRODUCED
	UV	VISIBLE	IR		
UV300	190-290			Gas	1980
UV7000	200-290			Gas	1983
IR7000			400-3000	Oil	1984
IR7200			400-3000	Oil, Coal	1984
C7000	185-225		500-1000	Oil, Coal	1991
<i>iscan</i>	250-400	650-750	400	Gas, Oil, Coal	1999

### Coen Leads the Way

Coen introduced the *iscan* digital flame scanning system in 1999. The *iscan* uses a solid state UV cell operating in the near UV and visible light region with a flame flicker feature. The microprocessor analyzes and provides detailed flame information with precise set-points for flicker frequency, threshold and other parameters. The Windows-based software automatically sets up all

parameters and allows the detector to learn flame on and off conditions.

Coen went one step ahead with this advanced design. The *iscan* does not have a separate amplifier. The scanner, signal processing, amplification, and all components are mounted in one integrated unit. ***iscan* is truly the most advanced detector in the world today.**

boiler explosions were caused by a loss of flame and delayed re-ignition. Monitoring flames and stopping fuel flow with a quick response time on loss of flame was most important.

The earliest flame detectors were simple thermocouples with very poor response times. Flame rod sensors, commonly used in home heaters, had good response times, but were hard to maintain in an industrial environment. A non-flame contact optical sensor was needed.

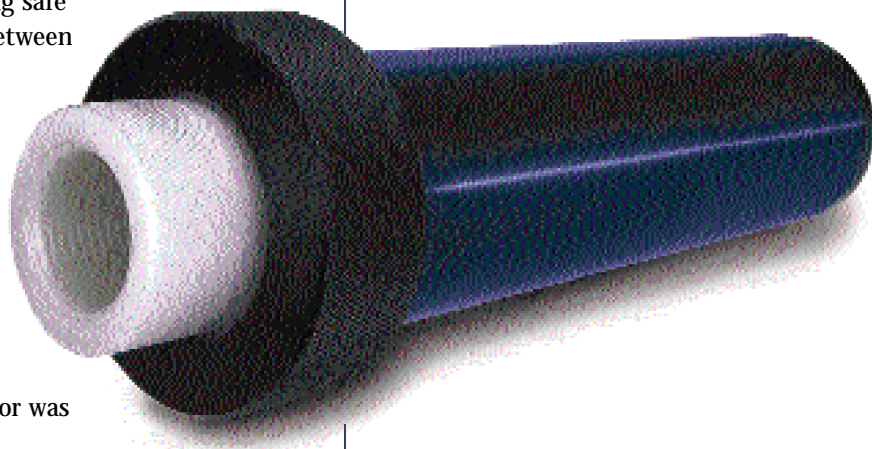
### Early Scanners

The first optical detector, the UV tube, contained two electrodes mounted in a quartz glass tube filled with an inert gas. When voltage was applied in the presence of UV radiation, a pulsating electrical signal was generated. An amplifier processed this signal and provided a flame on/off output.

flames. These detectors had problems of being “fooled” by hot surfaces like refractory walls creating the illusion of real flame.

All of these early scanners were suitable in specific applications but none were suitable in multiple burner boilers where adjacent flames were detected, creating false signals. New flicker frequency flame detectors followed which sensed differences in flame frequency between adjoining burners—allowing safe discrimination between burners.

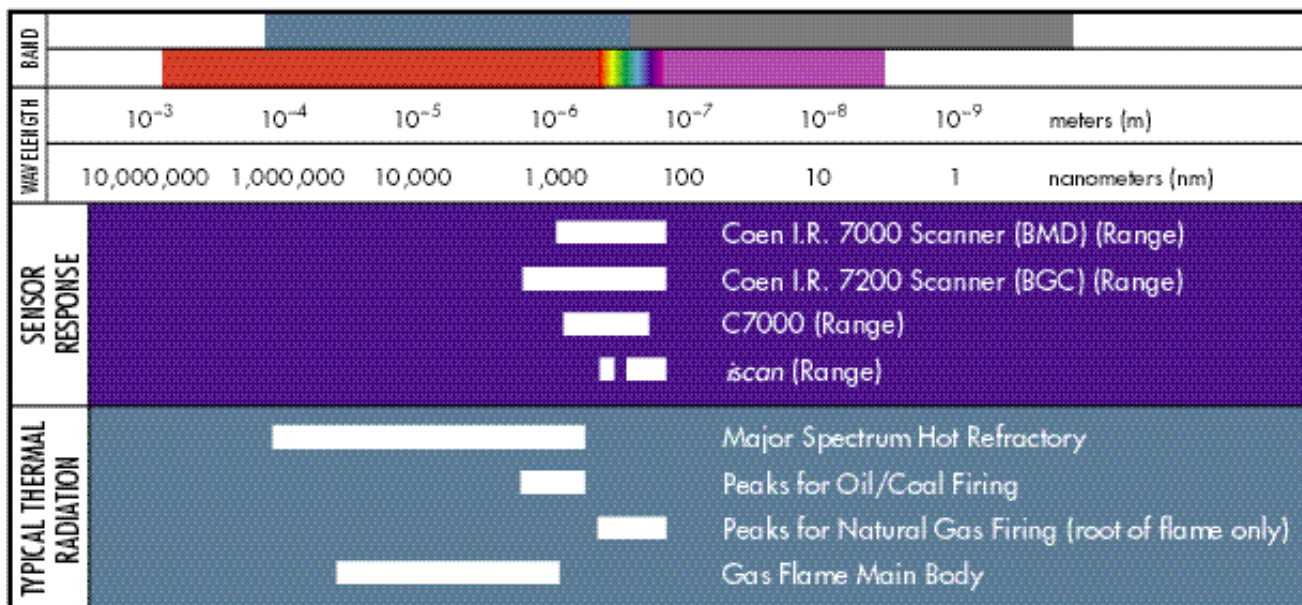
With varying fuel prices, combination gas, oil and coal firing became more prevalent and a combination UV tube and IR sensor was



# FastFacts About Scanners

- Flame scanner sensors detect radiant energy produced by burner flames in the ultraviolet, visible, and infrared energy spectrum of electromagnetic radiation, which ranges from x-rays to AM radio broadcast signals.
- Flame scanning allows burners to operate safely by preventing fuels from entering the combustion chamber unless combustion is established and continuous.
- Scanners are used for both “friendly” and “unfriendly” fires.
- The UV tube is the most common detector of ultraviolet radiation. The useful sensitivity range is wavelength from about 180 nanometers to 235 nanometers. The UV detector is used mostly for detecting gas flames.
- Infrared radiation, together with visible light, accounts for 99% of a flame’s spectrum radiation.
- Flame scanners are made up of light receivers that detect and convert light into an electrical signal, process that signal and provide discrete and analog flame status.
- Scanner designs range from simple to highly sophisticated, with associated prices from \$300 per loop to more than \$6,000 per loop.
- All flames have three radiation zones: Ultraviolet (UV), Visible Light (VL) and Infrared (IR). In most flames, UV constitutes about 1%, Visible Light is about 10% and the remaining is IR radiation.
- The first flame scanners were trained technicians. The flame scanner product was not in common use until the 1960s.

## Flame Scanner Spectra



For more information on Coen products,  
visit our web site at [www.coen.com](http://www.coen.com).

# History of Coen Scanners



- Coen introduced its first scanner to the utility market in 1980.
- Coen introduced the UV7000 flame scanner in 1983. This scanner contains an ultraviolet detecting tube that detects gas flame wavelengths in the range of 200-290 nanometers.

- In 1984, Coen introduced the IR7000 flame scanner with the first continuous adjustable flicker frequency filter. This scanner contains an IR Silicon Photodiode to detect oil or coal flame wavelengths in the range of 400-1100 nanometers. Even today, Coen's detector is the only one with the continuously adjustable flicker frequency feature.

- Coen also introduced the IR7200 scanner in 1984. The IR7200 scanner uses a dual Silicon Photodiode and Lead Sulfide Cell to detect oil, coal and waste fuel wavelengths from 400-3000 nanometers.

- Coen introduced the dual sensor C7000 flame scanner in 1991. Coen is one of only a few manufacturers to offer a dual sensor flame scanner. The C7000 contains a UV tube that detects wavelengths from 185-225 nanometers. A second IR Silicon Photodiode sensor detects wavelengths from 500-1000 nanometers. The C7000 is suitable for sensing gas, oil and coal flames.

- Coen's revolutionary *i*scan Flame Scanning System came on the market in 1999. The *i*scan uses a solid state sensor that operates in the near UV and visible region. The sensor measures wavelengths from 250-400 and 650-750 nanometers. The *i*scan is suitable for sensing gas, oil and coal flames.



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Visit our website at  
[www.coen.com](http://www.coen.com)  
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