Compact laser gas detection for unmanned vehicle platforms

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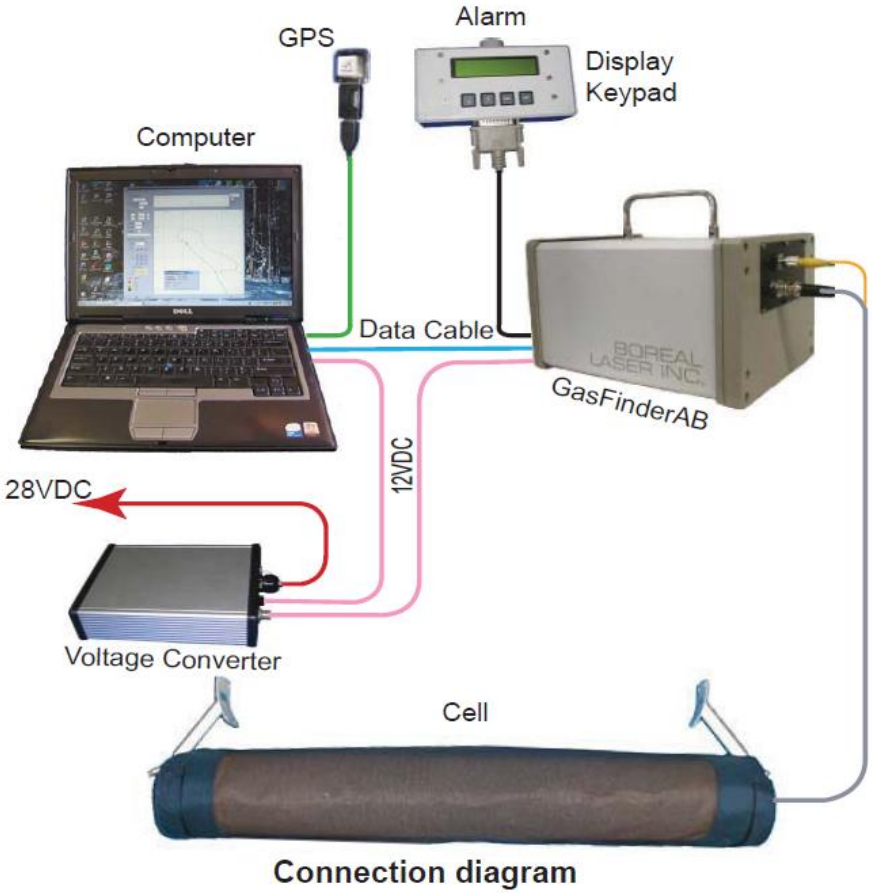
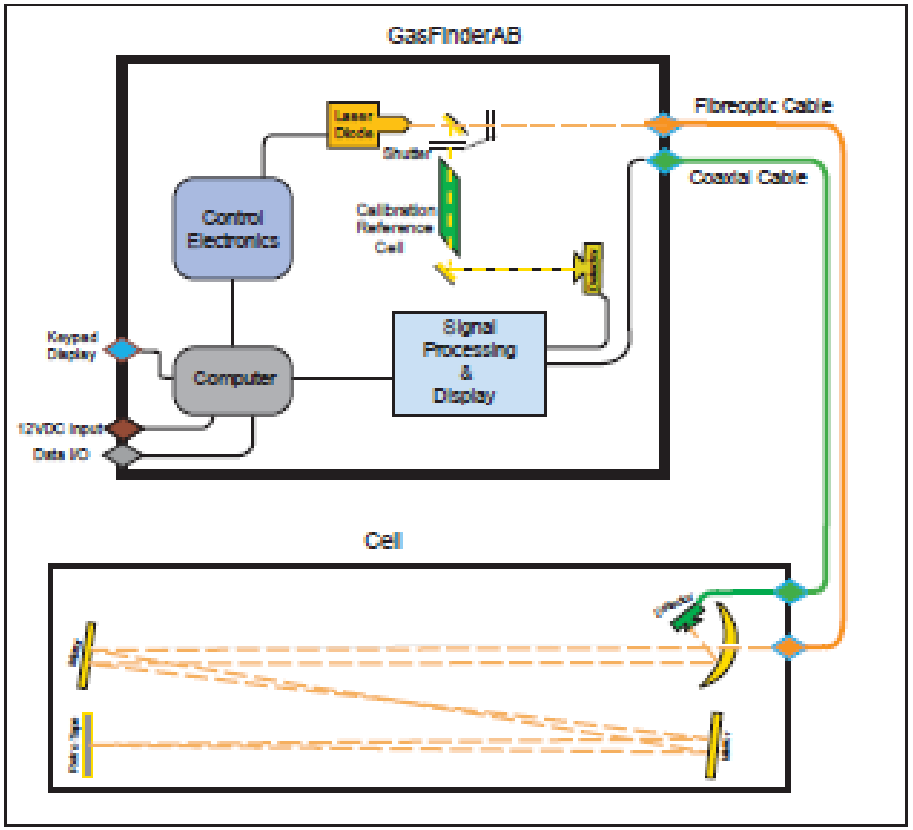
ACAMP Emerging Pipeline Technologies Seminar
29th September, 2014

GasFinderAB - current airborne leak detection



Connection diagram



Typical GFAB installation

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GasFinderAB mounted in helicopter cabin (left) and multiple pass cell mounted under cabin (right).

Detection Limit & Accuracy	<1 ppm (CH_4)
Range	0 to 100 ppm (CH_4)
Alarm settings	Default 10 ppm
Data rate	3 readings per second
Recommended speed	60 – 100 knots
Recommended altitude	50 – 65 m (150 – 200 feet)

Airborne system schematic

Helicopter mounted GasFinderAB detects elevated levels of CH4 in plumes resulting from leaks in high pressure natural gas pipelines

GasFinderAB – current status

1. **40 systems sold worldwide during past 12 years**
   - 33 in North America - 7 overseas
   - 35 for airborne surveys – 5 for ground surveys
   - 38 for methane (CH4) detection – 1 for carbon dioxide (CO2) detection
2. **Inquiries and system sales at all-time high.**
   - Still predominantly North American
   - Driven by increased awareness of pipeline integrity
3. **Strong interest in future development of technology for:**
   - UAV and ground based platforms
   - Non-methane (e.g. liquid hydrocarbon) leak detection.
   - Environmental monitoring – especially Greenhouse Gases

Aerial Gas Detection Game Changers

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- **New Digital Laser Analyzer Platform – Boreal Laser**
  - Improved sensitivity → shorter measurement path lengths, smaller probes
  - Better stability over wider operating temperature range → -40C to +50C
  - More compact, lightweight packaging
  - Able to accommodate two lasers → dual gas capability
  - Able to accommodate longer wavelength lasers → see Mid IR Lasers below
- **Fixed wing UAVs – e.g. ISIS**
  - Payload bay doubles as electronics enclosure
  - Provides power, GPS, data comms → reduces Boreal instrument payload
  - Larger airframe → provides for robust mounting of gas sensing probe
- **Mid IR lasers – e.g. Norcada**
  - CH4 absorption 100 times stronger → path lengths can be a few cm instead of a few m → Rotary UAV configurations possible
  - Enables high sensitivity monitoring of other gases such as Ethane

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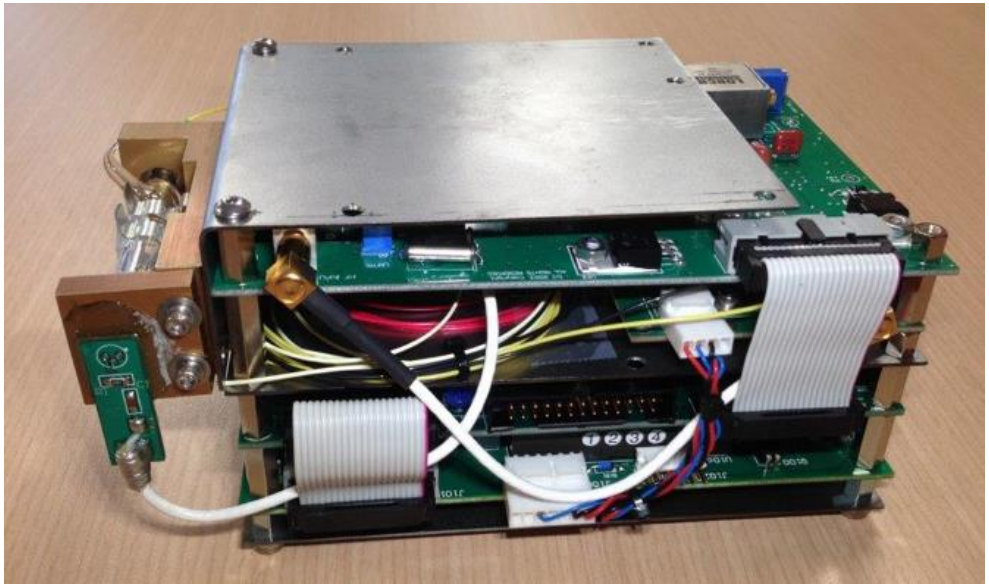
New Digital Electronics Platform



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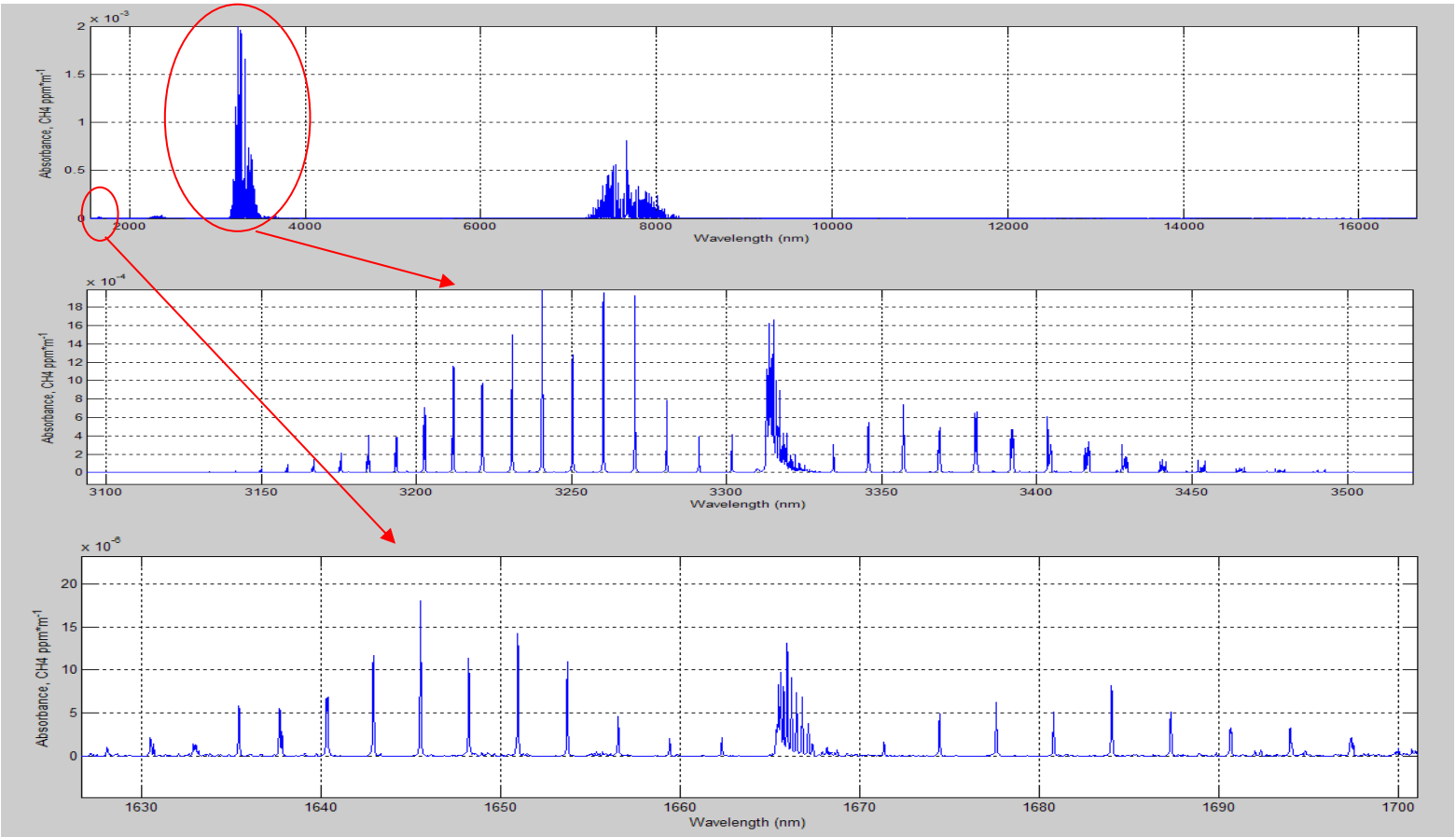
Fixed and rotary wing possible

Stronger lines in mid IR

CH4 spectra



Full IR

Mid IR

Near IR

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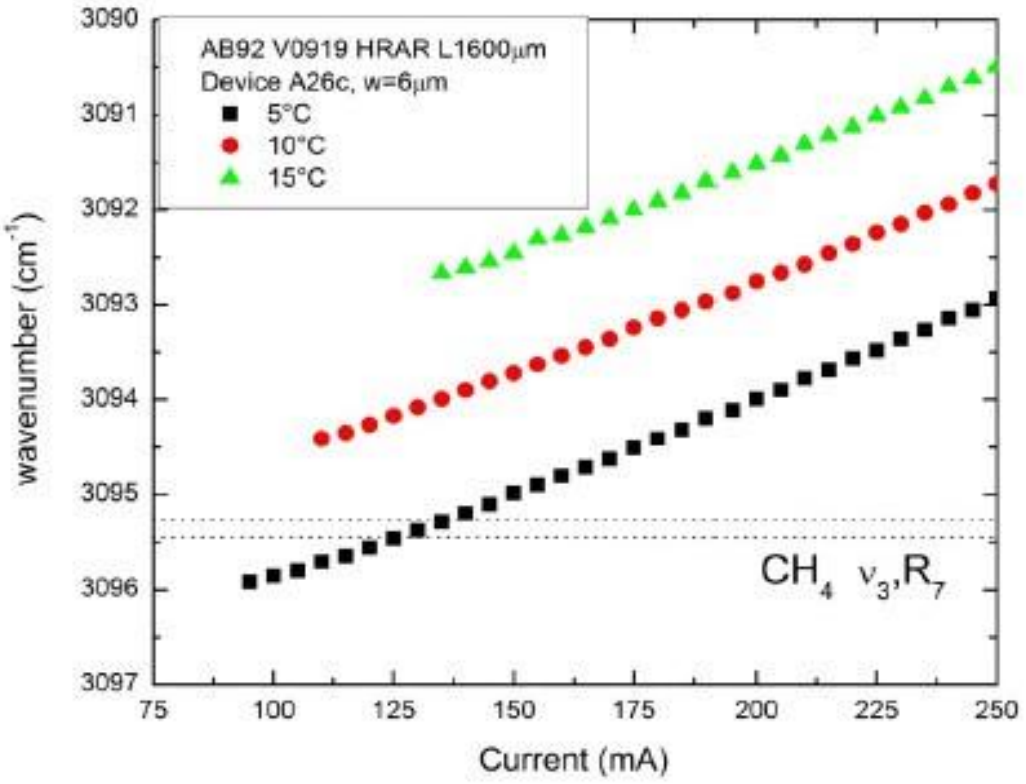
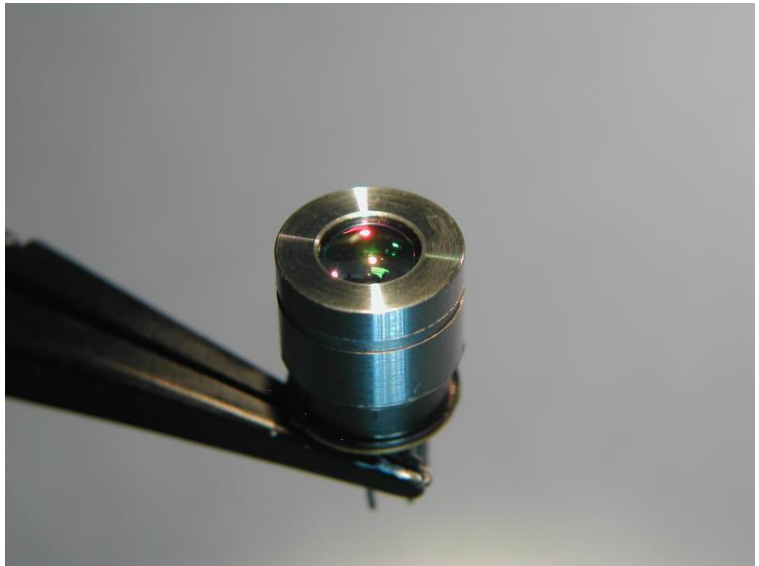
Norcada – mid IR Laser





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Weight and Volume reduction

		Current	Fixed Wing UAV
Laser Analyzer	Weight (g)	5,200	350
	Volume (cc)	8,483	1,350
	Power at 12 Vdc (mA)	2,000	1,000
	Operating Temperature Range (C)	-20 to +40	-40 to +50
	Scan Rate	3 Hz max	10 Hz max
	Laser Output (mW)	20	5
Remote Display	Weight (g)	200	n/a
	Volume (cc)	704	
Power Supply Converter	Weight (g)	1,200	n/a
	Volume (cc)	2,166	
Open Path Probe	Weight (g)	14,800	550
	Volume (cc)	89,700	1,000
	Power Requirements	Nil	Nil
Cables	Combined weight (g)	1,000	50
TOTALS	**Weight (g)**	**21,200**	**950**
	Volume (cc)	**101,052**	**2,350**

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Thanks for your attention!

Any Questions?

- Contact following for more information :
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