High-end Solution for the Analysis of FAME Traces in Jet Fuel using Gas Chromatography with a Unique Combination of Deans-Switching and Re-Focusing

- No Sample Preparation Required
- Unique Combination of Deans Switching and Re-focusing
- Handles Wide Range of Jet Fuels (e.g. Diesel Contaminated)
INTRODUCTION
Fatty-acid methyl ester or FAME, more widely known as biodiesel, is used as blending stock for diesel fuel in refinery applications. There is concern that other products, using the same production, storage, and transport systems such as aviation turbine fuel can become cross-contaminated with FAME and create problems with jet engine performance. Aviation turbine fuel is the most highly specified transportation fuel, but the airline industry recognized that a small amount of cross-contamination is unavoidable in a shared system. Therefore, a maximum concentration of FAME allowed in Jet Fuel is listed in the specifications.

ROBUST SOLUTION FOR ROUTINE ANALYSIS OF FAME TRACES IN JET FUEL
AC developed a unique GC application that does not require a highly educated chemist to operate the system. The analyzer is specifically designed so that it can be used for routine analysis by refineries, distribution/pipeline companies, independent labs, airline companies, military, or any other party for the measurement of FAME (biodiesel) in jet fuel.

FEATURES & BENEFITS
- Low investment cost
- No sample preparation required
- Unique combination of Deans switching and re-focusing with the advantages of gas chromatography
- Broad concentration range FAME
- Handles wide range aviation turbine (AVTUR) fuels (e.g. diesel contaminated)
- Excellent detectability, stability and repeatability
- Excellent separation and detection limits due to unique re-focus module
- No cryogenics for cold trap required (air only)
- Oven exhaust deflector
- Ease of Use
  - Easy calibration (linear system)
  - Low maintenance requirements, no fragile parts
  - Factory tuned for the methods specified
  - Guaranteed solution, includes one year hardware and application warranty
  - A global network of AC certified support engineers commissions the system on-site in two days
  - Includes free helpdesk assistance to any hardware or software related questions
  - Optional on-line remote support by LAN connection available

NO SAMPLE PREPARATION REQUIRED
Alternative methods require the operator to prepare the sample, such as accurately weighing the sample with internal standard, dilute the sample, or use Solid Phase Extraction techniques. The FAME in AVTUR analyzer is designed to eliminate the need for sample preparation. No Internal Standard (ISTD), no dilutions, and no Solid Phase Extractions techniques are used. The sample is injected neat in the GC inlet. This makes the AC Solution much more suitable for use by operators with little chemical background or laboratory skills.
**UNIQUE RE-FOCUS**

In order to achieve the low detection limits for the FAMEs in Aviation Turbine (AVTUR) fuel, the components are trapped on a cold trap. AC designed a unique re-focus module that eliminates the need for cryogenics, the cold spot is created by the use of compressed air. No cryogenics are used.

**Deans (microfluidics) Switch**

The AC FAME in AVTUR analyzer incorporates the principle described by D.R. Deans. The Deans principle is to control the pressure between two columns and direct a selection of the effluent of a (pre) column to a second (analysis) column. Using a pre-column and an analysis column of a very different nature - a polar and a non-polar column – it will separate the FAME traces.

**AC Finger Tight Nuts**

Based on 20+ years of experience in Deans systems, AC made modifications to the capillary flow bracket to improve user friendliness. The specially designed AC finger tight nuts allow easy and fast replacement of the capillary columns.

**Factory Plumbing for Quick Installation**

AC provides all inlet/detector plumbing so that only final gas connections to the gas supply are needed at installation. This guarantees flawless and fast onsite installation.

**Oven Exhaust Deflector**

The included oven exhaust deflector deflects the oven hot-air exhaust up and away from the instrument, improving oven cooling during and after the analysis.

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**ADVANTAGES OF DEANS**

- Pressure switch valve located outside oven
- Low dead volume
- No baseline disturbance
- Shorter switching times

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**EXCELLENT ANALYSIS PERFORMANCE**

The broad linear range of the AC analyzer results in high ease of use and calibration. The individual FAMEs of interest C16:0, C18:0, C18:1, C18:2, C18:3 are completely separated and individually measured. Calibration is done by a single level linear calibration analysis with the provided calibration sample. The range of Quantification for Total FAME concentration is from 2 – 50 mg/kg. This range can be extended (by changing injection volume), from 10 - 150 mg/kg to comply to possible future FAME specifications. The excellent stability and repeatability of the instrument minimizes calibration and maintenance on the instrument, while still achieving the sensitivity to measure the trace levels of FAME in jet fuel at sub-ppm levels.
Analysis Scope

Sample Matrix: Aviation Turbine Fuel (AVTUR)

Analysis Range: C16:0, C18:0, C18:1, C18:2, C18:3

Range of Quantification

- Individual FAME: 0.5 – 50 mg/kg*
- Total FAME: 2 – 50 mg/kg*; 10 – 150 mg/kg**

Retention Time Repeatability: < 0.02% RSD

Concentration Repeatability: < 5.0% RSD

Ordering Information

- CCG4800A: TRACE FAME IN AVTUR SYSTEM ON 120V 7890 GC
- CCG4800C: TRACE FAME IN AVTUR SYSTEM ON 230V 7890 GC
- CCG4800.100 KIT: CONSUMABLE PARTS TRACE FAME IN AVTUR
- CCG4800.200 KIT: SPARE PARTS TRACE FAME IN AVTUR

Utilities Requirements

- Carrier gas: Helium (99.999%)
- FID fuel: Hydrogen (99.999%) and Air
- Cooling: Compressed dry Air
- System Power: 110 - 230 Volts

Accessories Included

- Operating manual
- Calibration samples
- Reference samples
- Startup Kit
- Carrier Gas Filters
- Oven Exhaust deflector
- Factory plumbing for quick installation

Due to continuing product development, specifications subject to change at any time without notice.