

High End Solution for the Analysis of FAME Traces in Aviation  
Turbine Fuel using Gas Chromatography

# ANALYZER FOR FAME CONTAMINATION IN AVTUR

 **PAC**  
www.paclp.com



**ac**  
ANALYTICAL CONTROLS  
by **PAC**

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

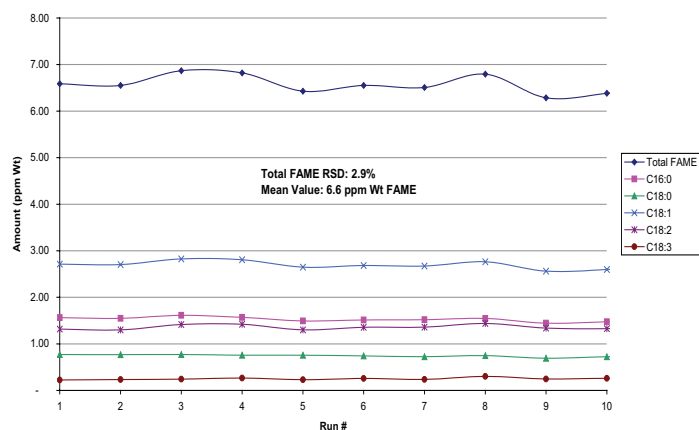
In order to achieve the low detection limits for the FAMEs in Aviation Turbine (AVTUR) fuel, the components are trapped on a cold trap. AC designed a unique re-focus module that eliminates the need for cryogenics, the cold spot is created by the use of compressed air. No cryogenics are used.

## 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

## ADVANTAGES OF DEANS

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



Repeatability FAME Content Jet Fuel Round Robin Sample

## 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

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

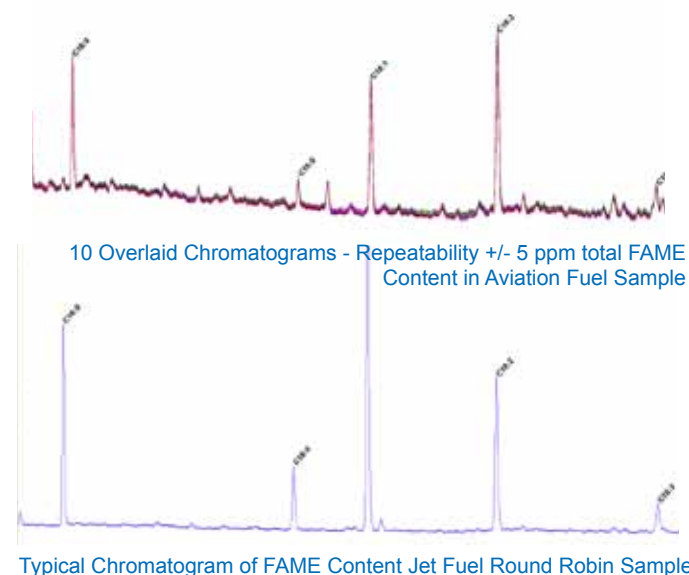
Based on 20+ years of experience in Deans systems, AC made modifications to the capillary flow bracket to improve user friendliness. The specially designed AC finger tight nuts allow easy and fast replacement of the capillary columns.

## 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.



(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.



# solidpartners provensolutions

## U.S.A.

PAC, LP | 8824 Fallbrook Drive | Houston, Texas 77064  
T: +1 800.444.TEST | O: +1 281.940.1803 | F: +1 281.580.0719  
sales.usa@pacpl.com | service.usa@pacpl.com

## FRANCE

BP 70285 | Verson | 14653 CARPIQUET Cedex  
T: +33 (0) 231 264 300 | F: +33 (0) 321 266 293  
sales.france@pacpl.com | service.france@pacpl.com

## GERMANY

Badstrasse 3-5 | P.O.Box 1241 | D-97912 Lauda-Königshofen,  
T: +49 9343 6400 | F: +49 9343 640 101  
sales.germany@pacpl.com | service.germany@pacpl.com

## SINGAPORE

61 Science Park Road | #03-09/10 The Galen  
Singapore Science Park III | Singapore 117525  
T: +65 6412 0890 | F: +65 6412 0899  
sales.singapore@pacpl.com | service.singapore@pacpl.com

## NETHERLANDS

P.O.Box 10.054 | 3004 AB Rotterdam  
Innsbruckweg 35 | 3047 AG Rotterdam  
T: +31 10 462 4811 | F: +31 10 462 6330  
sales.netherlands@pacpl.com | service.netherlands@pacpl.com

## RUSSIA

Shabolovka Street | 34, Bldg. 2 | 115419 Moscow  
T: +7 495 617 10 86 | F: +7 495 913 97 65  
sales.russia@pacpl.com | service.russia@pacpl.com

## CHINA

Room 1003, Sunjoy Mansion | No. 6 RiTan Rd.  
Chao Yang District | Beijing 100020  
T: +86 10 650 72236 | F: +86 10 650 72454  
sales.china@pacpl.com | service.china@pacpl.com

## INDIA

1036 Regus | Trade Center, Level 1  
Bandra (E) - 400 051 | Mumbai  
T: +91 22 40 700 447 / 700 | F: +91 22 40 700 800  
sales.india@pacpl.com | service.india@pacpl.com

## MIDDLE EAST

A1 Quds Street, A1 Tawar road | LIU#H13 Dubai Airport Freezone  
Near Dubai Airport (terminal 2) | P.O.Box #54781 | Dubai, UAE  
T: +971 (0)4 2947 995  
sales.middleeast@pacpl.com | service.middleeast@pacpl.com

## SOUTH KOREA

#621 World Vision Building | 24-2, Youido-dong  
Seoul 150-010  
T: +82 2785 3900 | F: +82 2785 3977  
sales.southkorea@pacpl.com | service.southkorea@pacpl.com

## THAILAND

26th Floor, M. Thai Tower | All Seasons Place  
87 Wireless Road | Lumpini, Phatumwan | Bangkok 10330  
T: +66 2627 9410 | F: +662627 9401  
sales.thailand@pacpl.com | service.thailand@pacpl.com

PAC Authorized Representatives are also located in most countries worldwide. For more information visit [www.pacpl.com](http://www.pacpl.com)

## SPECIFICATIONS

Analysis Scope	
Sample Matrix	Aviation Tubine Fuel (AVTUR)
Analysis Range	C16:0, C18:0, C18:1, C18:2, C18:3
Range of Quantification Individual FAME	0.5 – 50 mg/kg*
Range of Quantification 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, SPARE PARTS TRACE FAME IN AVTUR
CCG4800.200	KIT, CONSUMABLE 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.

## AC Analytical Controls®

has been the recognized leader in chromatography analyzers for gas, naphtha and gasoline streams in crude oil refining since 1981. AC also provides technology for residuals analysis for the hydrocarbon processing industry. Applications cover the entire spectrum of petroleum, petrochemical and refinery, gas and natural gas analysis; ACs Turn-Key Application solutions include the AC Reformulyzer, SimDis, HiSpeed RGA and DHA instruments.



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