

# GA-FDM

*Fly with Intelligence.™*



Powered by:



*It's all about the data™*

[www.ga-fdm.com](http://www.ga-fdm.com)

## Flight Data Monitoring for General Aviation



- GA-FDM provides an affordable FDM foundation for individuals or fleet operations
  - Robust flight data, analysis and reports to guide your SMS
  - Firewalled privacy protections
  - On-board ETMS and FOQA analysis and backend algorithms turn mountains of data into useable intelligence
  - Immediate, secure web-accessible reports, available 24/7
  - Automated and totally hands-free
  - Guided by experts focused on FDM as a core competency
- Better, safer training, operations and validation through GA-FDM and The Silent Mentor™



# Web-centric tools and reports

- GA-FDM built using a terrabyte-capacity SQL relational database
- Automatic uploads after every flight
- Web-based analysis and reports
- FOQA/MOQA analysis tools
- Flight simfiles for replays
- GoogleEarth trackfiles
- Analysis graphs
- Comprehensive on-line reports
- On-line access from any browser



# What are the benefits of an FDM program?

- An enhanced understanding of how flights are really being conducted
- Data to support existing procedures
- Development of tools to enhance safety
- Information to address operational concerns
- Improvements in operational behavior
- Potential to significantly reduce costs
- Aggregate data to discover systemic trends





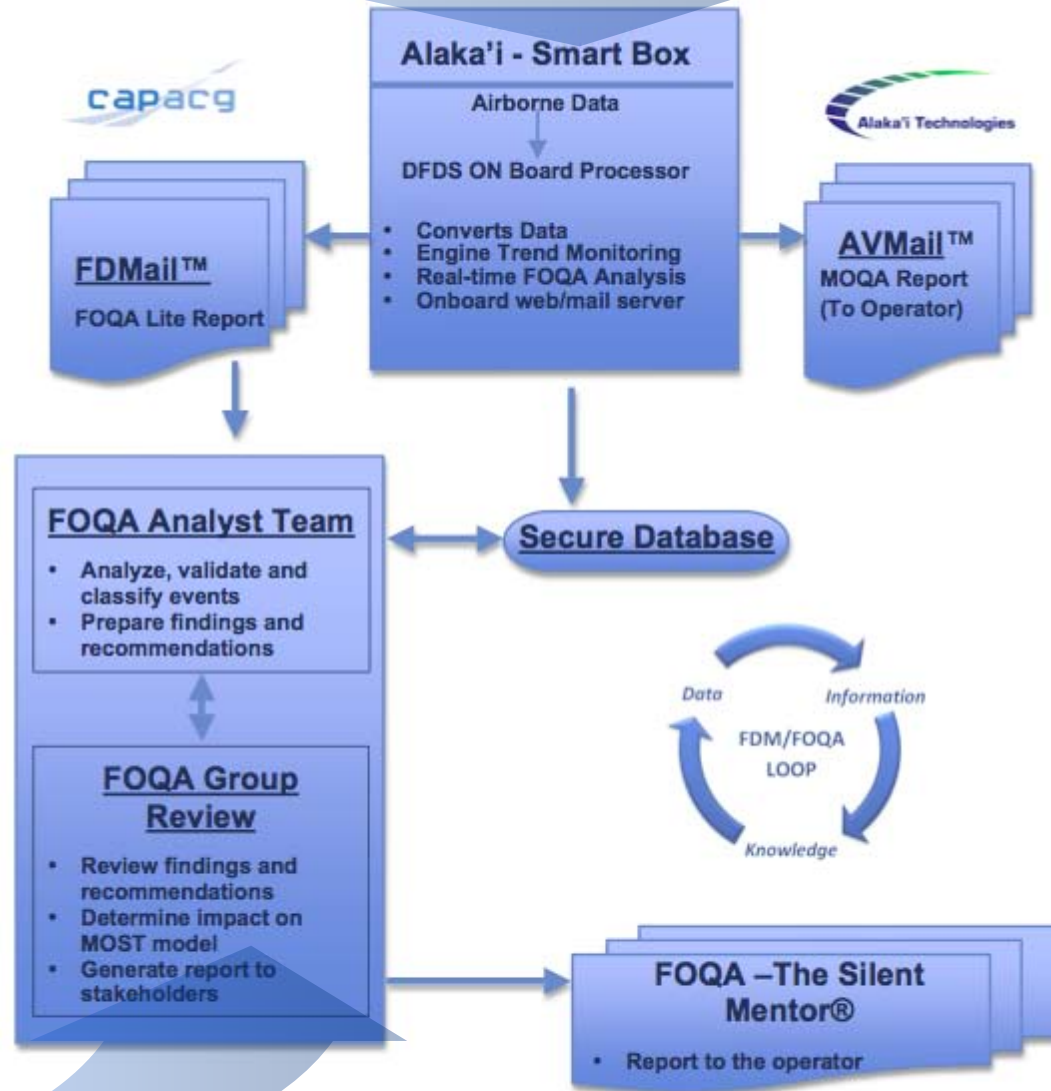
# GA-FDM Process Model

## (1): Embedded Analysis (technology)

- Onboard processing of MOQA and FOQA events
- Onboard analysis of Engine Trends
- Human-readable files
- No custom analysis station
- Onboard web/mail server
- Totally automated reporting

## (2): Experienced analysts (people)

- Review - validate - classify
- Act - actionable reporting
- Continually monitor



## ■ Fleet-oriented, with monthly summary reports

- Guaranteed data privacy (Gatekeeper w/ De-ID data) ✓
- AvMail, FDMail, TrendMail ✓
- Flight graphs, GE trackfiles, SimFile playback ✓
- Professional analysis (GA-FDM Reports) ✓
- 24/7 Database and Report access ✓
- Optimized for fleet operations ✓
- FDM data focused on pilot actions and safety ✓
- Individual as well as fleet monitoring and diagnostics ✓
- Organization-based FOQA benefits ✓
- Analysts review - validate - classify ✓
- Analysts monitor and provide actionable reports ✓
- Aggregate data on airframe and engine use ✓
- Aggregate data to discover systemic trends ✓
- Electronic logbook integration ✓
- Electronic Out - Off - On - In times ✓
- Daily access to all online reports and data ✓
- Monthly summary data by tail number or fleet ✓
- Top 10 FOQA and MOQA reports ✓
- Flight playback (virtual flight sim) ✓
- Trackfile playback (GoogleEarth) ✓
- Leverage with Suppliers (engine, insurance) ✓
- eMOST benefits ✓
- Special Studies (Analysis & Reports) ✓



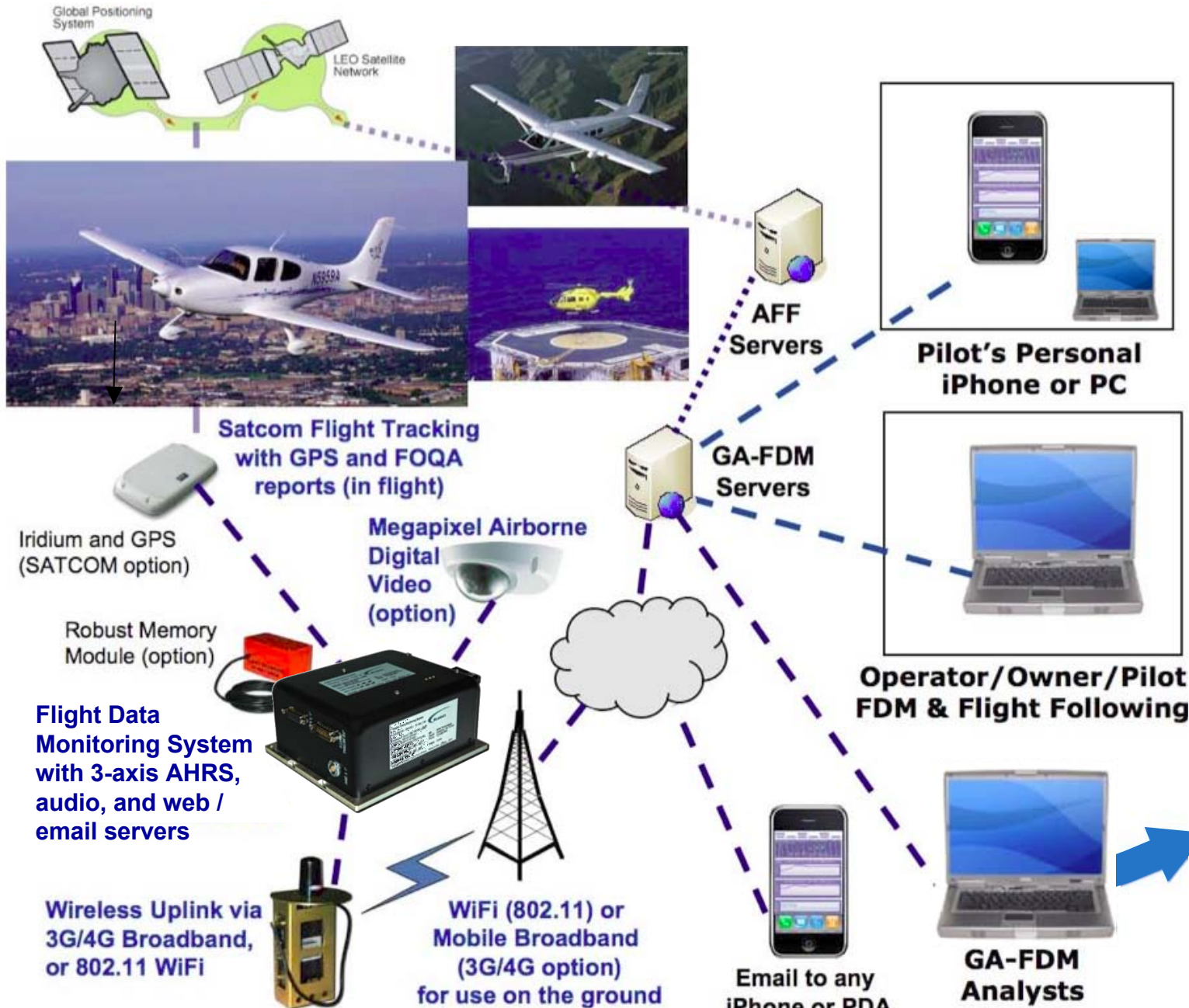
Fee per report, by request



# GA-FDM

Fly with Intelligence.™

# GA-FDM's Scalable FDM Architecture



## GA-FDM Analysis and Reports

SAVEair FOQA/MOQA

**GA-FDM**

**Executive Summary - De-Identified**

Showing Top 10 FOQA Events by Fleet for 1 of 1, starting on 06-01-2008 for a 1 MONTH interval.

| Rank | Flight Number | Event Group | Event Name | Event Code | FOQA Event ID | Flights with this Event | Percentage of Total Events |
|------|---------------|-------------|------------|------------|---------------|-------------------------|----------------------------|
| 1    | 101           | FOQA1       | CLP-MASS   | 1          | 1             | 1                       | 100%                       |
| 2    | 102           | FOQA2       | CLP-MASS   | 2          | 1             | 1                       | 100%                       |
| 3    | 103           | FOQA3       | CLP-MASS   | 3          | 1             | 1                       | 100%                       |
| 4    | 104           | FOQA4       | CLP-MASS   | 4          | 1             | 1                       | 100%                       |
| 5    | 105           | FOQA5       | CLP-MASS   | 5          | 1             | 1                       | 100%                       |
| 6    | 106           | FOQA6       | CLP-MASS   | 6          | 1             | 1                       | 100%                       |
| 7    | 107           | FOQA7       | CLP-MASS   | 7          | 1             | 1                       | 100%                       |
| 8    | 108           | FOQA8       | CLP-MASS   | 8          | 1             | 1                       | 100%                       |
| 9    | 109           | FOQA9       | CLP-MASS   | 9          | 1             | 1                       | 100%                       |
| 10   | 110           | FOQA10      | CLP-MASS   | 10         | 1             | 1                       | 100%                       |

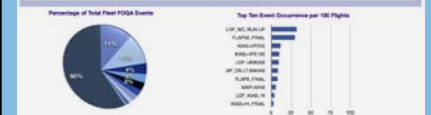
SAVEair FOQA/MOQA

**GA-FDM**

**Top 10 FOQA Events By Fleet - De-Identified**

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|------|---------------|-------------|------------|------------|---------------|-------------------------|----------------------------|
| 1    | 101           | FOQA1       | CLP-MASS   | 1          | 1             | 1                       | 100%                       |
| 2    | 102           | FOQA2       | CLP-MASS   | 2          | 1             | 1                       | 100%                       |
| 3    | 103           | FOQA3       | CLP-MASS   | 3          | 1             | 1                       | 100%                       |
| 4    | 104           | FOQA4       | CLP-MASS   | 4          | 1             | 1                       | 100%                       |
| 5    | 105           | FOQA5       | CLP-MASS   | 5          | 1             | 1                       | 100%                       |
| 6    | 106           | FOQA6       | CLP-MASS   | 6          | 1             | 1                       | 100%                       |
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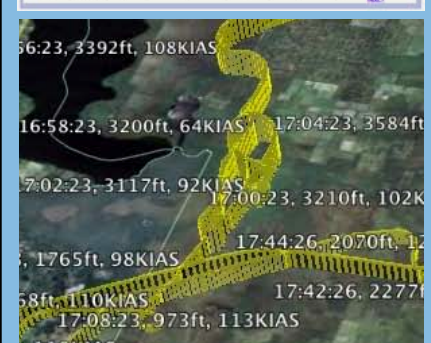
SAVEair FOQA/MOQA

**GA-FDM**

**MOQA Report - De-Identified**

Showing MOQA Report 1 of 1, starting on 06-01-2008 for a 1 MONTH interval.

| Rank | Flight Number | Event Group | Event Name | Event Code | FOQA Event ID | Flights with this Event | Percentage of Total Events |
|------|---------------|-------------|------------|------------|---------------|-------------------------|----------------------------|
| 1    | 101           | FOQA1       | CLP-MASS   | 1          | 1             | 1                       | 100%                       |
| 2    | 102           | FOQA2       | CLP-MASS   | 2          | 1             | 1                       | 100%                       |
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## GoogleEarth Trackfiles



Play back any flight

# DFDS Equipment Specifications (COTS equipment)

- Low-cost flight data recorder with embedded processor for real-time engine and FOQA analysis
- Multiple databus interfaces and types
- Self-contained AHRS, air data, analog, audio and discrete interfaces for non-databus aircraft
- Qualified to DO-160F (full lightning and HIRF protection)
- FAA certified (STC)
  - Proven in Air Taxi, Flight School and individual use
- Wireless (802.11 b/g and/or 3G/4G broadband)
- Robust Memory Unit option for data survivability
  - Waterproof
  - 1000 G crash force
  - 2012°F flame
- Meets or exceeds ED-155 standards

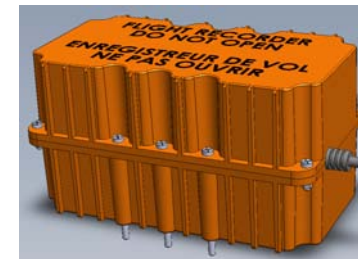


**DFDS**



**Wireless Link**

**RMU**





## ■ Interfaces and Environmental:

- Dual-core embedded processor for real-time engine and FOQA analysis
- Self-contained AHRS and Air Data interfaces for non-databus aircraft
- Qualified to DO-160F (full lightning and HIRF protection)
- Arinc 429 (3), RS-232 (5), RS-422, USB 2.0 (4), 100Mb Ethernet (2), MIL-1553 (Option), Audio (option)
- Discretes (16 in/8 out),  $\pm 10V$  analog (6), Torque (2), Diff (6) ( $\pm 40V$  CMV, 0.5V diff) and Tach (2) inputs (add'l inputs available)
- FAA certified (multiple STCs)
- Meets or exceeds ED-155 standards
- Power Consumption: Less than 8 watts
- Weight – DFDS: 2.9 pounds; Wireless: 1.6 pounds



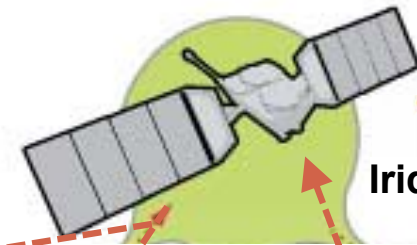
DFDS



# Options for 2-Way Messaging and Flight Following

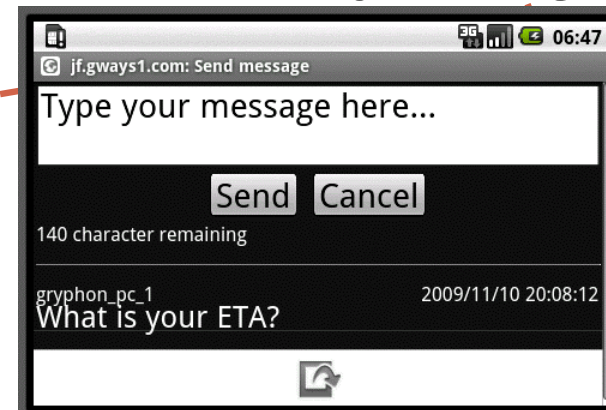


Position and  
in-flight  
FOQA Events  
(periodic or  
on-condition)



Iridium satellite  
network

## Cockpit 2-way Texting



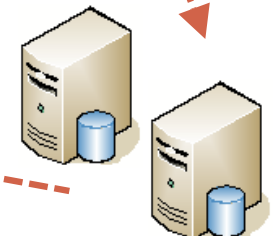
## Ground / OPS center



## 2-way Texting



Tracking, Mapping,  
and FDM Reporting  
(periodic, or on condition)



## Messaging Servers

- **Data aggregation is the empowering factor in improving safety**
  - **Flying a smarter, more connected airplane**
    - On-board and backend algorithms turning mountains of data into decisions and actions
    - Internet-accessible maintenance and operational (FOQA) corrections and improvements
    - Operating procedure changes
  - **Leverage with suppliers (i.e. engine manufacturer, aircraft providers)**
  - **Leverage for fleet operators**
    - Immediate access to analysis and reports
    - How's this airplane performing vs the fleet
- **FDM programs shift the focal point from single incidents to aggregate systemic trends**
- **Anecdote becomes action; safety is enhanced, and maintenance data supports real savings**





## ■ Real data to support Maintenance and Operations

- Automated Out, Off, On, and In times
- Daily / Weekly summary data by tail or by fleet
- Maintenance data
- FOQA data and Top 10
- Flight replays
- GoogleEarth trackfiles
- Operating cost reductions
- Electronic logbooks

## ■ Enhanced Safety and Training

- Mentoring, standardization, and pilot operational feedback

## ■ Automatic flight following (option) via satcom

- Position reports, FOQA advisories, 2-way text messages

## ■ Comprehensive, survivable flight data recorder



- Continuing aviation proficiency
  - ‘Silent mentor’ for VLJs
- Reduced operating costs
- Increased engine Time Between Overhaul (TBO)
- Electronic logbooks
- Simplified maintenance (similar to On-Star)
- Comfort that aircraft is ‘talking to the factory’
- Enhanced resale value
- Peace of mind / safety



In single pilot operations, sometimes a “Virtual Co-pilot” is a good idea

■ Early identification of

- Adverse safety trends
- Misinterpreted SOPs

■ Risk and Resource Management

- Uncover threats and errors
- Mitigate risk





## GA-FDM (ALAKAI / CAPACG) FDM PRODUCT SUITE

AS350, EC130: JAN 2011. BH206, BH212: FEB

AVAILABLE / IN-PROCESS STCS 2011. FIXED-WING STCS ALREADY FIELDIED.

## MEETS ALL 5 R'S

|          |                                     |
|----------|-------------------------------------|
| RECORD   | 80 TO 175 PARAMETERS                |
| RETRIEVE | AUTOMATED, HANDS-OFF RETRIEVAL      |
| REVIEW   | PROFESSIONAL ANALYSIS FOR FLEET OPS |
| REPORT   | WEB-ACCESSIBLE REPORTS & ANALYSIS   |
| REPEAT   | PROVEN FEEDBACK FOR SMS             |

## INPUT CHANNELS

|                             |                |
|-----------------------------|----------------|
| RS-232                      | 5              |
| RS-422                      | 1              |
| RS-423                      | 1              |
| ARINC 429                   | 3 CHANNELS     |
| MIL-1553B                   | 3 CHANNELS     |
| ETHERNET                    | 2 10/100 PORTS |
| USB 2.0                     | 2 EXTERNAL     |
| ANALOG INPUTS, 0-10V        | 6              |
| DIFF ANALOG HIGH CMV 0-2.5V | 6              |
| TORQUE                      | 2              |
| TACH / RPM                  | 2              |

DFDS



## DISCRETES

|                             |    |
|-----------------------------|----|
| OPTO-ISOLATED INPUTS        | 16 |
| OPTO-ISOLATED 2A FET SWITCH | 8  |

## FEATURES

|                       |                             |
|-----------------------|-----------------------------|
| AHRS                  | BUILT-IN 6 DOF              |
| AIR DATA              | OPTIONAL                    |
| MEETS ED-155          | YES                         |
| DO-160F               | YES                         |
| AUTO FLIGHT FOLLOWING | OPTIONAL IRIDIUM SATCOM AFF |
| 2-WAY TEXT TO COCKPIT | OPTIONAL VIA IRIDIUM        |
| DIGITAL VIDEO         | OPTION                      |
| COCKPIT VOICE         | OPTION                      |
| HARDENED STORAGE      | OPTION                      |

RMU



## ENVIRONMENTAL

|                           |     |
|---------------------------|-----|
| DO-160F                   | YES |
| ED-155                    | YES |
| LIGHTNING / HIRF IMMUNITY | YES |

|        |                   |
|--------|-------------------|
| POWER  | LESS THAN 8 WATTS |
| WEIGHT | 2.9 LBS           |

## PROVEN SYSTEM

|                           |  |
|---------------------------|--|
| CUSTOMER BASE             | AIR TAXIS, FLIGHT SCHOOLS, OFF-SHORE<br>HELICOPTERS, OEMS, HUMANITARIAN AID (UN) |
| ROTARY AND FIXED-WING FDM | COMPLETE, ROBUST FDM FOR GA  |

## FDM/FOQA FEATURES

|                               |   |
|-------------------------------|---|
| EMBEDDED ANALYSIS             | REAL-TIME FOQA ANALYSIS   |
| AUTOMATIC UPLOADS             | WIFI, BROADBAND, GSM  |
| AUTOMATIC DATABASE LINK       | AUTOMATIC, HANDS-FREE   |
| AFFORDABLE                    | DESIGNED SPECIFICALLY FOR GA  |
| FULL FDM ANALYSIS AND REPORTS | WEB-ACCESSIBLE  |
| PERFORMANCE MONITORING        | YES   |
| ENGINE TREND MONITORING       | YES   |
| DATA AGGREGATION              | AUTOMATIC   |
| SILENT MENTOR™                | MENTORING FOR CONTINUAL IMPROVEMENT                                       |
| LOW-LATENCY REPORTS           | WITHIN SECONDS OF TOUCHDOWN   |
| OPEN ARCHITECTURE             | YES   |
| IMMEDIATE EMAIL TO PDA/IPHONE | YES   |
| WEB-ACCESSIBLE, 24/7          | YES   |
| DE-IDENTIFIED DATA            | YES   |
| NO GROUND STATION FEES        | NONE.   |
| FIREWALLED DATA PRIVACY       | YES   |
| ACTIONABLE REPORTS            | YES   |
| LOGBOOK INTEGRATION           | OPTION  |
| EXECUTIVE SUMMARIES ON-LINE   | INSTANT   |
| TOP 10 REPORTS                | INSTANT   |
| PLAYBACK ANY FLIGHT           | INSTANT   |
| TRACKFILES                    | INSTANT   |
| PERFORMANCE GRAPHS            | INSTANT   |
| SPECIAL EVENT STUDIES         | YES   |
| ON-CONDITION MAINTENANCE      | YES   |
| ANALYSIS-ONLY OPTIONS         | JUST REPORTS  |
| FULL FOQA PROGRAM OPTIONS     | WE ASSIST, OR ACT AS YOUR FOQA TEAM                                       |
| FOQA, FDM, ASAP EXPERIENCE    | MULTIPLE PROGRAMS, YEARS OF EXPERIENCE                                    |
| EARLY IDENTIFICATION          | FIND ADVERSE SAFETY TRENDS  |
| EMOST                         | ECONOMICS, FOCUSED ON MOST  |
| RISK AND RESOURCE MANAGEMENT  | UNCOVER AND MITIGATE OPERATIONAL RISKS                                    |
| PROFESSIONAL ANALYSIS         | GA-FDM SPECIALIZES IN DESIGNING AND<br>IMPLEMENTING FDM AND FOQA PROGRAMS |
| PROVEN SOLUTIONS              | <a href="http://WWW.GA-FDM.COM">WWW.GA-FDM.COM</a>                        |



WIRELESS



## Notes

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