
Description

Installation of Aerodata FIS

Table of Contents

1	General Information	3
1.1	Scope	3
1.2	Purpose	3
1.3	Flight Inspection System (FIS)	3
1.4	Certification	3
1.5	Program Plan	3
2	Technical Summary	4
2.1	Design Elements	4
2.2	Installation of Aerodata FIS	4
2.3	Modification/Adaptation of Aerodata FIS	5
3	Aircraft Performance	5
4	Design Characteristics	6
4.1	Health and Safety Criteria	6
4.2	Materials and Workmanship	6
4.3	Electrical Bonding and Protection against Lightning and static Electricity	7
5	FIS Requirements	7
5.1	Electrical Power System	7
5.2	FIS Antenna Requirement	8
5.3	Weight Data	9
5.4	Dimensions	10
5.4.1	Operator Console (OPCO)	10
5.4.2	Operator Workstation (OPWS)	11
5.4.3	Equipment Holder (EQHO)	12
5.5	FIS Block Diagrams	13
5.5.1	Antenna Distribution	13
5.5.2	Data Distribution	14
6	Documentation	15

1 General Information

1.1 Scope

The bidder shall perform design and certification tasks to integrate the Aerodata flight inspection system (AFIS) into the aircraft. This document describes the necessary modifications, which have to be performed to install the existing flight inspection system to the new aircraft.

1.2 Purpose

The design philosophy for this A/C modification is to fulfill the following roles:

- Mission (flight inspection) flight
- Flights per existing AFM

1.3 Flight Inspection System (FIS)

FIS manufacturer: Aerodata AG

P/N: AD-AFIS-130 consisting of:

- AD-OPCO-0130
- AD-OPWS-0222
- AD-EQHO-0300

The FIS is based on three components:

- The operator console (OPCO) contains the main components required for flight inspection like: receivers, computers and RF-switching unit.
- The operator workstation (OPWS) provides the user interfaces for the operator like: Control panel, keyboard and display.
- An Equipment Holder (EQHO) is equipped as RF-Analysis Rack. It contains a signal generator and a spectrum analyzer or oscilloscope for on board RF-Analysis and testing.

1.4 Certification

The A/C type shall be certified by a supplemental type-certificate (STC) for the above mentioned modification by the EASA.

1.5 Program Plan

The aircraft modification, installation and certification shall be performed by the bidder.

Design and certification tasks shall be performed by an EASA certified design organization. Installation shall be performed by an EASA Part 145 maintenance organization. The bidder shall provide evidence that he has experience in installing flight inspection systems in this type of aircraft (at least two systems in this type of aircraft within the last three years).

2 Technical Summary

The installation of the Aerodata FIS requires some modification and additional installations.

The installation requires mechanical and electrical design work on the A/C as installation of antennas, structural modifications for the operator console, workstation and electrical interfaces with installation of the Aerodata FIS.

During the installation process the interfaces to the FIS hardware shall be tested for all certification related functional aspects as well as non-interference with required systems and services.

2.1 Design Elements

The FIS consisting of:

- Operator Workstation,
- Operator Console and
- Equipment Holder

Modification of electrical interfaces between aircraft and FIS:

- power supply
- signal distribution and data interfaces
- antenna installation
- cabling
- intercom
- cockpit layout design

2.2 Installation of Aerodata FIS

The installation of the new Aerodata FIS shall include:

- Modification of existing power supply, signal distribution, antenna installation and electrical looms.
- Installation of a new FIS master switch in the cockpit
- Installation of FIS circuit breaker / switches

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- Connection to the A/C intercom system with function to enable/disable communication between cabin and cockpit.
 - Installation of an EGPWS/TAWS aural warning inhibit switch
 - Installation of event push buttons on pilots control yokes
 - Installation of FIS Guidance Update switches on pilots control yokes
 - Installation of an interface to primary EFIS for display of FIS flight guidance and autopilot coupling for lateral and vertical steering.
 - Installation of the existing (from L410) Aerodata FIS Cockpit Information Display for display of flight guidance in the cockpit.
 - Installation of an interface to aircraft ADC.
 - Installation of interfaces to A/C VHF-COMs
 - electrical interface to aircraft attitude and heading reference data
 - installation of the new FIS (Operator Workstation, Operator Console and Equipment Holder)

2.3 Modification/Adaptation of Aerodata FIS

The installation of the FIS in the new aircraft requires adaptation of FIS hard and software:

- Adaptation to new equipment interfaces (ADC, AHC, FMS, EFIS etc.)
- Adaptation to new Flight Director/Autopilot
- Adaptation to new antenna location (lever arms)
- Adaptation to new antenna cable loss
- Adaptation to new antenna characteristic patterns
- Adaptation to new sensor locations (ADC, AHC)
- Mechanical adaptations (if required)
- Electrical Adaptation (if required)

Any modification to the FIS shall be performed by the FIS OEM (Aerodata) only. The bidder shall provide a Letter Of Intent (LOI) issued by the FIS OEM for the cooperation between the bidder and the FIS OEM.

3 Aircraft Performance

The aircraft performance shall be as per original Pilot's Operating Handbook

4 Design Characteristics

The Aerodata flight inspection system shall be installed into the new flight inspection aircraft. Main parts of the Aerodata FIS are the OPCO, OPWS, EQHO.

The seating position of the operator shall be close to the A/C's center of gravity in direction of flight.

The FIS integrates a dedicated intercom system for communication in the cabin. It shall be possible to enable/disable communication between pilots and cabin intercom system.

The FIS interfaces the A/C VHF-COMs. It shall be possible to use the A/C VHF-COM radios for receive and transmit from the FIS.

FIS guidance shall be provided on the primary EFIS for pilot and/or copilot. FIS guidance shall provide lateral guidance, vertical guidance and distance. It shall be possible to couple the flight director / autopilot to the guidance information displayed on the EFIS. The bidder shall provide evidence that he has experience with such installation under certification with an EASA STC.

A switch shall be installed in the cockpit that allows inhibiting aural warnings by the EGPWS/TAWS during calibration approaches, flown with gear up. The bidder shall provide evidence that he has experience with such installation under certification with an EASA STC.

The existing FIS Cockpit Information Display (of the L410) shall be installed in the instrument panel of the new aircraft.

The FIS shall electrically interface the A/C's attitude and heading reference system.

The FIS shall interface the A/C's FMS (navigation data) for RNAV procedure evaluation.

The FIS shall electrically interface the aircraft Air Data Computer.

The bidder shall be responsible for the required modification of the FIS soft- and hardware in cooperation with the FIS OEM.

4.1 Health and Safety Criteria

Materials used for the A/C modification shall be selected to present minimum toxic hazard to the crew or maintenance personnel. Prohibited materials such as PVC (Poly-vinyl-chloride) insulation must not be used. Aircrew and maintenance personnel safety, during flight, ground handling and maintenance operations shall be a primary design consideration.

4.2 Materials and Workmanship

The methods of fabrication shall be in accordance with the requirements for aviation parts and equipment.

All standard parts like nuts and fasteners shall be selected from aviation or similar standards (e.g. LN, NAS, DIN, etc.)

4.3 Electrical Bonding and Protection against Lightning and static Electricity

The FIS system installation shall be designed to prevent electromagnetic interference with other systems. Electromagnetic compatibility and proper bonding shall be demonstrated as part of the ground test to show that there is no interference with the aircraft essential systems.

5 FIS Requirements

5.1 Electrical Power System

The FIS system shall be connected to the aircraft power system by means of switches and relays.

The FIS shall be supplied with DC and AC power through its own circuit breakers or limiter.

It shall be analysed, that the electrical system of the aircraft can carry the additional load of the FIS system. In case of generator failure the FIS shall be completely disconnected from the aircraft power system.

The installation shall be such that the risk of mechanical damage and/or damage caused by fluids, vapors or sources of heat, is minimized.

A FIS system a Master switch shall be installed in the cockpit. The switch shall be easily discernible and accessible to the pilot.

A FIS power switch for normal operation is located at the Operator Workstation. Whenever power is switched on by this switch a corresponding annunciation shall be illuminated in the cockpit.

The FIS integrates a dedicated FIS transponder. A FIS XPDR enable switch shall be installed in the cockpit. If FIS XPDR is enabled the primary transponders should be switched off to ensure that only one transponder is active at a time.

The power consumption of the FIS is as follows:

The 28VDC power consumption of the FIS is typical 32,47 A, maximum is 43,36 A.

The 115VAC power consumption of the EQHO is typical 1,41 A, maximum is 1,63 A.

The Equipment Holder shall be provided with AC power only when FIS is on.

5.2 FIS Antenna Requirement

The following antennas shall be installed to the new aircraft dedicated for the FIS:

Add'l FIS Antennas installed	Connected to FIS
LLZ/VOR #1	VOR/LLZ
GP#1	GP
LLZ/VOR #2	VOR/LLZ,
GP #2	GP
MKR	Marker
GPS L1/L2	GPS receiver
VHF	VHF-COM
L-Band #1	DME#1
L-Band #2	DME#2
L-Band #3	XPDR
L-Band #4	spectrum analyzer L-band
UHF/VHF Broadband	spectrum analyzer VHF/UHF
GPS	spectrum analyzer GPS
UHF	(P)DGPS uplink telemetry
ADF #1	ADF
ADF #2	spectrum analyzer ADF
OmniSTAR	Wide Area DGPS

Since the FIS compensates for antenna lever arms and antenna characteristic, the following data must be determined after installation and incorporated to the FIS software:

- Antenna lever arms
- Antenna characteristics
(antenna gain and polar diagrams for various frequencies)
- Antenna cable loss

5.3 Weight Data

The weight of the A/C and the corresponding center of gravity shall be determined by weighing the airplane with FIS installed.

The configuration of the aircraft at the time of weighing shall be defined and stated in the Aircraft Flight Manual Supplement for the FIS installation.

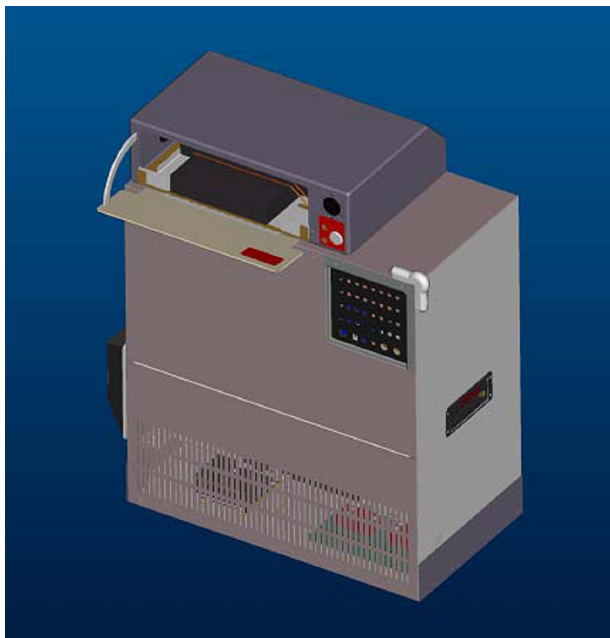
A weight and balance report for configuration with FIS installed shall be provided. The weight and balance report shall allow calculating the weight and balance for configuration without FIS installed.

The main FIS weight data is as follows:

Component	Weight [lbs]
Operator Console	93.70
Operator Workstation	256.84
Equipment Holder (without equipment mounted)	36.38

5.4 Dimensions

5.4.1 Operator Console (OPCO)



Component	Length (without RDP Cover)	Width	Height
Operator Console	840 mm	450 mm	1066 mm

5.4.2 Operator Workstation (OPWS)



Component	Length (without bars)	Width	Height
Operator Workstation	625 mm	740 mm	1200 mm

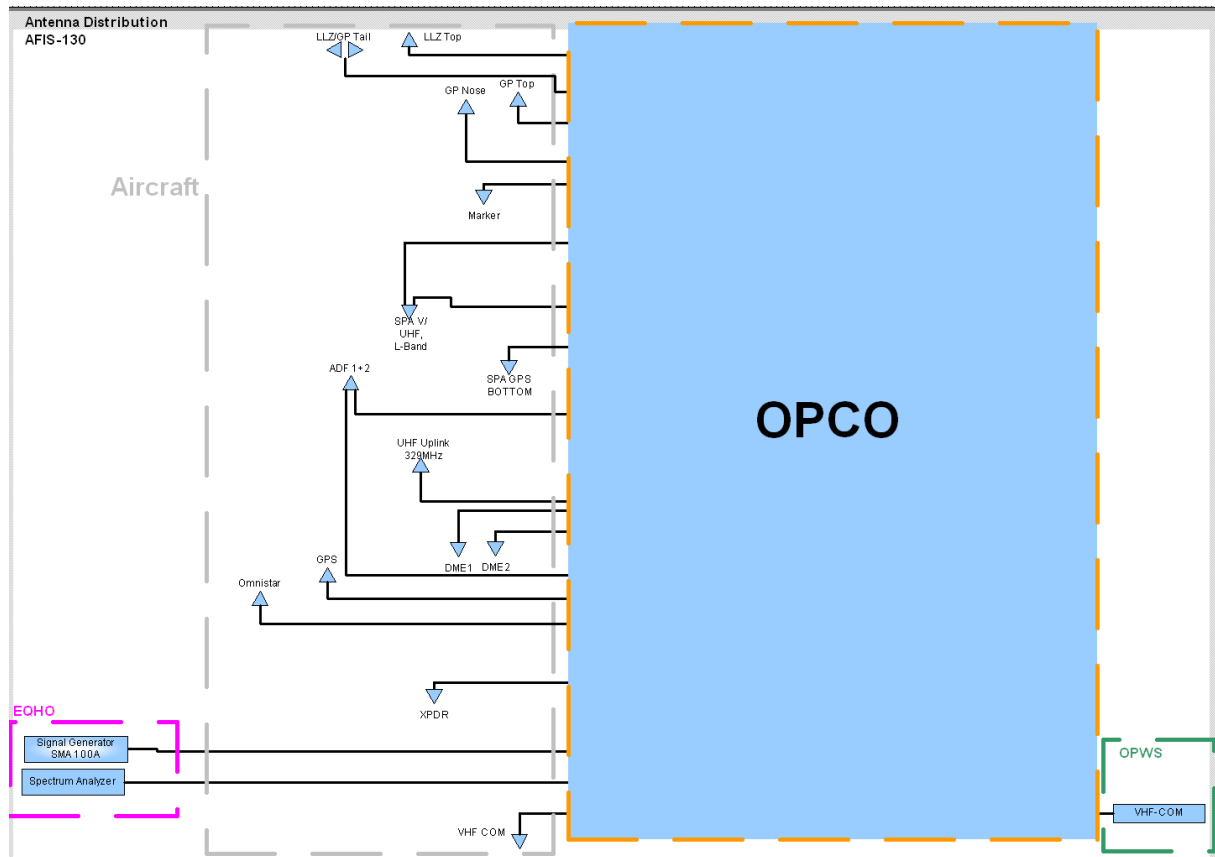
5.4.3 Equipment Holder (EQHO)



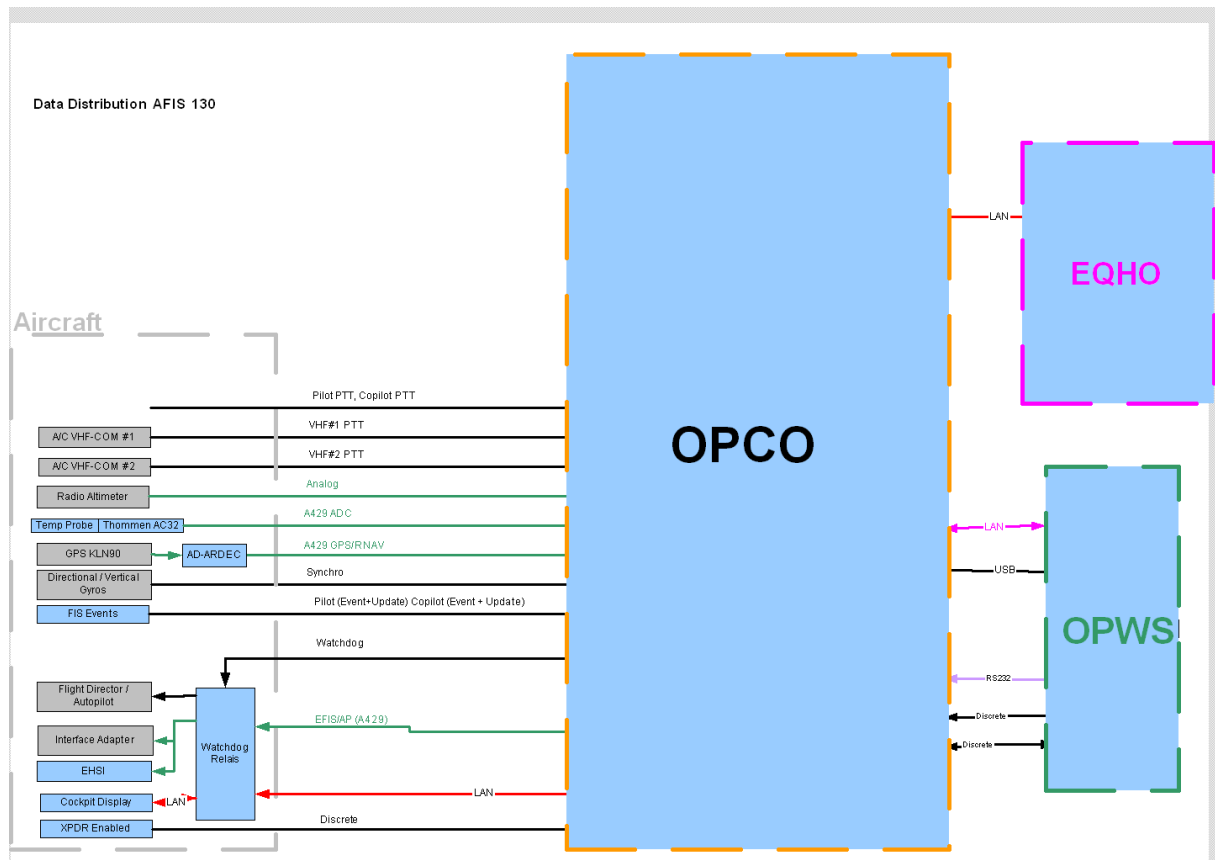
Component	Length	Width	Height
Equipment Holder	625mm	292mm	430mm

5.5 FIS Block Diagrams

5.5.1 Antenna Distribution



5.5.2 Data Distribution



6 Documentation

At least the following documentation shall be provided for the installation of the FIS into the new aircraft:

- Installation Design Description
- Wiring Diagrams (schematics)
- Stress Analysis for aircraft installations
- Installation Manual Supplement
- Maintenance Manual Supplement
- Weight and Balance Report
- EMI/EMC Test Report
- Ground Test Report
- Flight Test Report
- Aircraft Flight Manual Supplement
- EASA STC