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Manual 20-0109-01ICA

Instructions for Continued Airworthiness for Flight Data Monitor System into Agusta A109 and A119 Series Helicopters

Revision: 3
Date: 03-15-17

Modification of an aircraft by this Supplemental Type Certificate (STC) Number SR03055CH obligates the aircraft operator to include the maintenance information provided by document in the operator's aircraft maintenance manual and the operator's aircraft scheduled maintenance program.

The inspections specified in this document are FAA Accepted. The Airworthiness Limitations section (Section 2) of this document is FAA approved and specifies maintenance required under FAR 43.16 and 91.403, unless an alternative program has been FAA approved.

Revision Log
Report 20-0109-01ICA

Revision	Description	Pages	Date	MSP Aero, LLP	
				Checked	Approved
0	Initial release.	All	07-15-10	T. Lindsey	R. Ahlsten
1	Throughout document - changed "flight monitor system" to "flight data monitor system"; Page 4 – added FDMS definition; Page 6 and 12 – added alternate 28 VDC bus #2 location; Page 6, 7, 8, 9, 10 and 12 – added alternate circuit breaker locations; Page 7 – added alternate GPS antenna location	All	01-26-11	T. Lindsey	R. Ahlsten
2	Additional contact information; Update parts removal; Updated wiring diagram; added AW109SP model; added parts installation applicability.	5, 6, 7, 8 and 12	04-14-14	A. Sylvester	R. Ahlsten
3	Allows operation with FDMS before verification of recorded data; Added existing internal resistor to wire harness in electrical drawing.	10, 11 and 12	03-15-17	A. Sylvester	R. Ahlsten

Critical Instruction Format

CAUTION: This is an operating procedure, practice, method, etc. which if not strictly observed could result in damage or destruction of equipment.
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NOTE: This is an operating procedure, practice, method, etc. which is essential to highlight.

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Always destroy superseded pages when revised.

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Abbreviations and Definitions

Abbreviation	Term	Definition
CFR	Code of Federal Regulations	Codification of the general and permanent rules and regulations published in the Federal Register by the executive departments and agencies of the United States Federal government.
DER	Designated Engineering Representative	A representative appointed by the FAA to oversee specific parts of an FAA project
FAA	Federal Aviation Administration	Agency of the United States Department of Transportation with authority to regulate and oversee all aspects of civil aviation in the United States.
FDMS	Flight Data Monitor System	The physical parts and assemblies described in this ICA to record information during flight and ground aircraft operations.
FOQA	Flight Operation Quality Assurance	A method of capturing and analyzing data generated from an aircraft moving through the air
Gb	Gigabit	Unit of information or computer storage equal to 1,000,000,000 bits (equal to 125 megabytes)
GPS	Global Positioning System	A system used to identify the longitude, latitude and in some instances the altitude of a given object.
Hz	Hertz	Unit of frequency based upon cycles per second.
ICA	Instructions for Continued Airworthiness	Document specifying actions taken to insure the airworthiness of a device.
IMU	Inertial Measurement Unit	A unit used for sensing motion - including the rate and direction of rotation and acceleration.
mA	Milliamp	A unit of electrical current equal to .001 amp.
PMA	Parts Manufacturer Approval	Combined design and production approval, from the FAA, for modification and replacement parts. It allows a manufacturer to produce and sell these parts for installation on type certificated products. The approval procedures for FAA personnel and guidance for PMA applicants is outlined in FAA Order 8110.42.
SMS	Safety Management System	The formal, top-down business approach to managing safety risk, which includes a systemic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.
STC	Supplemental Type Certification	Type Certificate issued when an applicant has received FAA approval to modify an aircraft from its original design.
WAAS	Wide Area Augmentation System	System of ground-based antennas whose precisely known locations are used to correct the satellite signals and provide greater positional and integrity of service to aircraft in flight.

1.0 Introduction

The purpose of this Instruction for Continued Airworthiness (ICA) Manual is to address 14 CFR Part 27 requirements as contained in Appendix A (A27.1 through A27.4). This ICA satisfies the requirements of FAR 27.1529, and provides the information necessary to complete the on-going maintenance and inspections for the installation.

This manual provides details for the inspection, repair and parts replacement for MSP Aero, LLP flight data monitoring system (FDMS) into Agusta Models A109, A109A, A109A II, A109C, A109K2, A109E, A119, A109S, AW119 MKII and AW109SP helicopters. This manual is intended for use by flight data monitor system operators. All repairs should be made by FAA qualified maintenance personnel only. Any modifications, major repairs, parts replacement or other alterations not described in this manual must have additional approval documentation as required by the FAA.

NOTE: MSP Aero may, without prior notice, and with the approval of the FAA, cancel, supersede or declare obsolete any part, kit or publication referenced within this manual.

Because of the rigorous manufacturing and inspection standards used by MSP Aero, only genuine MSP Aero approved parts should be used for repair and maintenance of MSP Aero products. Parts that are from sources not approved by MSP Aero (salvaged parts, reworked parts, or parts that the service history cannot be authenticated) should not be used, and could be dangerous if used. Any parts which have been subjected to excess stress or heat may be unsafe for aircraft use.

NOTE: The owner / operator shall ensure that the latest revision of this manual and any other publications referenced within this document is used when servicing MSP Aero parts.

1.1 Distribution

The ICA Manual, Operator's Manual, Flight Manual Supplement, Wiring Diagrams, Installation Drawing copy of the STC will accompany the flight data monitoring equipment during the original delivery. This ICA manual will be updated as required by FAR changes and/or manufacturers' recommendations. Any changes that are made will be accepted by the FAA before implementation. The updated materials will be sent to the owner/operator of the original equipment via courier or e-mail. If the equipment is resold it will be up to the original owner to contact Spectrum Aeromed as to the contact information for the subsequent owners. Updates will supersede original documents. Contact information for MSP Aero may be made at:

MSP Aero, LLP
3700 East 70th Street
Minneapolis, MN 55450

Email: info@mSPAero.com
Phone: (612) 727-1285
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To determine the latest approved revision level for the flight data monitoring system (FDMS) STC documents and data such as the ICA (Instruction for Continued Airworthiness), FMS (Flight Manual Supplement), Installation drawing, software level, etc. inquire at info@mSPAero.com.

For support, configuration questions and technical assistance with the Monitor Unit contact:

Appareo Systems, LLP
1810 NDSU Research Circle North
Fargo, ND 58102

Email: [E-mail: support@appareo.com](mailto:support@appareo.com)
Phone: (701) 356-2200

1.2 System Description

The MSP Aero flight data monitor system (FDMS) uses data gathering equipment from global positioning, image capturing, flight attitude acquisition and ambient audio recording to provide high fidelity information regarding aircraft movement through space. There are two main components installed in the aircraft: the monitor unit and the GPS antenna.

The monitor unit is a video and audio recording device augmented with an independent inertial measurement based data acquisition system. The system contains a 5 mega pixel digital image sensor, an ambient cockpit audio recording device and several Micro-Electro-Mechanical System (MEMS) components to gather data. The MEMS parts include: gyroscopes (3), accelerometers (6) and internal compass (3 axis). Other major components include internal flash memory, removable memory chip and a sixteen (16) channel WAAS-enabled GPS module. The unit contains an Ethernet interface for external communications. Data is recorded to the internal memory and to the removable memory chip in real time. Typical data recorded includes: 2 mega pixel imagery, IMU data recorded at 4 Hz, and audio stored at 22 kHz. The flight monitor system uses 150 mA (.15 amps) of aircraft 28 VDC power.

1.3 FDMS Monitor Unit Software

The FA00 021 Monitor Unit has internal software that Appareo Systems LLP. This software is DO-178B level E and does not interface with any other aircraft systems. The operator should initially configure the Monitor Unit using documents supplied by Appareo with the FDMS system. These documents will give the operator information on focusing the images, downloading data, managing FDMS data, etc.

1.4 System Control and Operation

The flight data monitoring system automatically monitors the aircraft operation while the battery power is applied to the 28 VDC bus #1 (or alternate location on 28 VDC bus #2). A one amp circuit breaker located at the LH Aux Circuit Breaker Panel (RH Aux Circuit Breaker Panel or Main Circuit Breaker Panel alternate locations) and placarded FDMS provides electrical protection for the flight monitor system. This circuit breaker may be disengaged to remove power from the flight monitor system.

1.5 Parts Installation Applicability

The flight data monitoring system parts FA00 021 and FA00 025 with serial numbers 051 or greater may be installed under drawing 20-0109-01 revision 2 or greater. See drawing 20-0109-01 revision 1 for earlier FA00 021 and FA00 025 serial number installation instructions.

2.0 Airworthiness Limitations

The Airworthiness Limitations section is FAA approved and specifies maintenance required under 43.16 and 91.403 of the Federal Aviation Regulations (FAR) unless an alternative program has been approved.

No Airworthiness Limitations are associated with the flight monitor system modification.

3.0 Maintenance and Servicing

This section outlines the procedures for maintaining and servicing the flight monitor system.

3.1 Installation Data, Required Parts and Tools

Refer to MSP Aero drawing 20-0109-01 for detailed installation information for the flight monitor system. No special tools are needed to install this system. Refer to drawing 20-0109-01 and document 20-0109-01DL for the parts required for the flight monitor system. Only standard tools are needed to install or maintain this system and no special tools are needed.

3.2 Parts Removal

To remove parts for replacement or repair, follow these procedures. No special tools are needed to remove this system.

CAUTION: Before any part removal, ensure power is off to the flight data monitor system by turning off helicopter master switch and disengaging FDMS circuit breaker located on LH Aux, RH Aux or Main Circuit Breaker Panel.

A. To remove GPS Antenna FA00 022:

- (1) Turn off helicopter master switch and disengaging FDMS circuit breaker located on LH Aux, RH Aux or Main Circuit Breaker Panel.
- (2) Remove two screws and remove Bracket BA00 033 from LH Aux, RH Aux Circuit Breaker Panel or cabin forward bulkhead;
- (3) Disconnect GPS antenna cable to GPS Antenna;
- (4) Remove two screw and remove GPS Antenna (see figure 1 below).

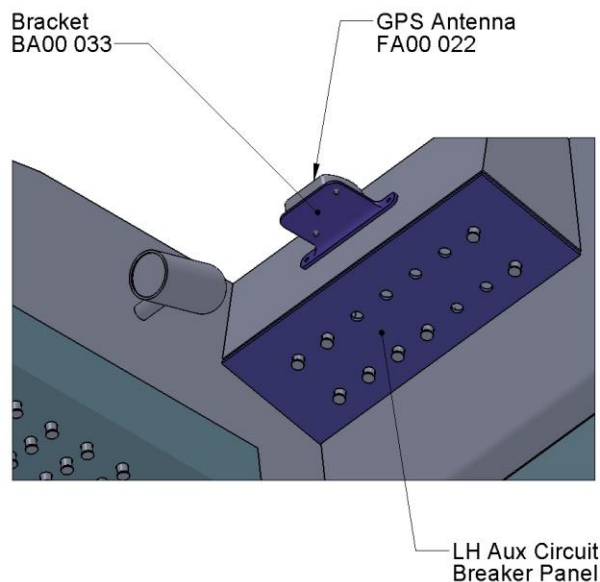


Figure 1 – GPS Antenna Removal (LH Aux location shown)

3.2 Parts Removal (continued)

CAUTION: Before any part removal, ensure power is off to the flight data monitor system by turning off helicopter master switch and disengaging FDMS circuit breaker located on LH Aux, RH Aux or Main Circuit Breaker Panel.

B. To remove Monitor Cover FA00 011:

- (1) Turn off helicopter master switch and disengaging FDMS circuit breaker located on the LH Aux, RH Aux or Main Circuit Breaker Panel.
- (2) Remove four screws and remove Monitor Cover (see figure 2 below).

C. To remove the Monitor Unit BA00 021:

- (1) Remove Monitor Cover as described in procedure B:
- (2) Disconnect GPS antenna cable and power connector to Monitor Unit;
- (3) Remove nut, bolt and washer to remove Bushings and Monitor Unit (see figure 2 below).

D. To remove the Bracket BA00 041:

- (1) Remove the Monitor Unit BA00 021 as described in procedure C;
- (2) Remove three screws to remove Bracket (see figure 2 below).

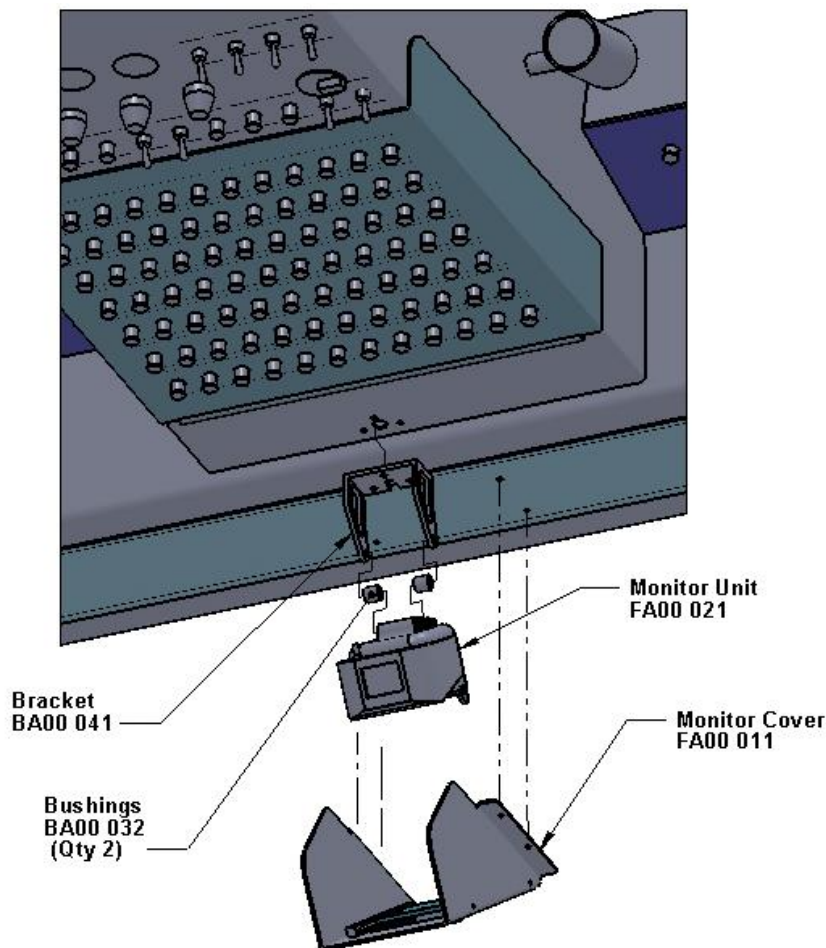


Figure 2 – Monitor Unit Removal

3.2 Parts Removal (continued)

CAUTION: Before any part removal, ensure power is off to the flight data monitor system by turning off helicopter master switch and disengaging FDMS circuit breaker located on LH Aux, RH Aux or Main Circuit Breaker Panel.

E. To remove FA00 024 Memory Chip:

- (1) Turn off helicopter master switch and disengaging FDMS circuit breaker located on the LH Aux, RH Aux or Main Circuit Breaker Panel.
- (2) Slide open Monitor Cover access panel.
- (3) Rotate small tab on Monitor Unit.
- (4) Rotate long tab on Monitor Unit.
- (5) Push in on FA00 024 Memory Chip and the Memory Chip will release from slot.

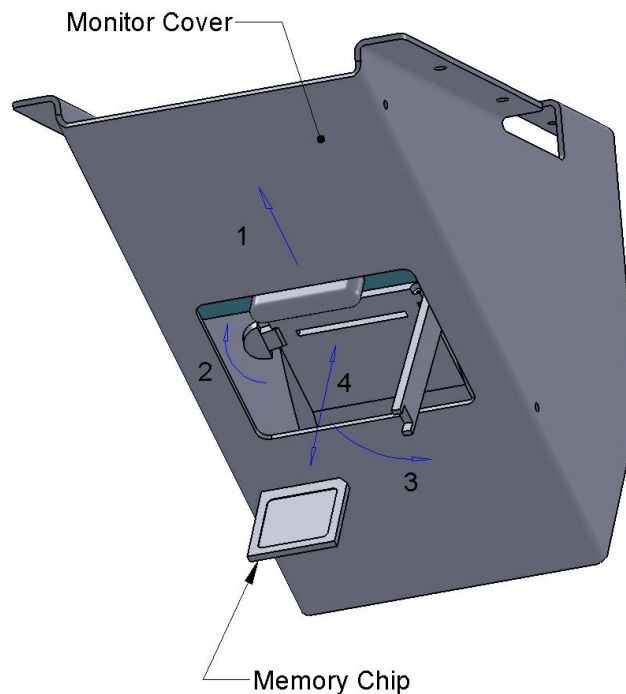


Figure 3 – Memory Chip Removal

F. To reinsert FA00 024 Memory Chip:

- (1) Turn off helicopter master switch and disengaging FDMS circuit breaker located on the LH Aux, RH Aux or Main Circuit Breaker Panel.
- (2) Slide open Monitor Cover access panel.
- (3) Rotate small tab on Monitor Unit.
- (4) Rotate long tab on Monitor Unit.
- (5) Push FA00 024 Memory Chip into slot in Monitor Unit.
- (6) Rotate long tab to original position.
- (7) Rotate small tab to lock long tab.
- (8) Slide closed Monitor Cover access panel.
- (9) Restore power to flight monitor system by resetting FDMS circuit breaker.

3.3 Weight and Balance Information

The installer must update the empty weight and balance and the rotorcraft equipment list after completing the flight monitoring system installation. The installation of this flight monitoring system will increase the rotorcraft empty weight by 3 pounds at a longitudinal station of 1920 mm (75.6 inches) aft of the datum. The lateral location of the flight monitoring system is on the aircraft center-line and will not affect the lateral C.G.

3.4 Maintenance Intervals

There are no parts or components in this flight data monitor system that have mandatory replacement times. The mechanic should follow these guidelines when making MSP Aero component repairs and performing maintenance. All maintenance should be properly documented after final inspection and completion.

The following maintenance intervals should be followed by the operator:

- 1) Initial System Inspection – This inspection must be made after the flight data monitor system installation and prior to placing the flight monitor system into service (see Section 3.5, page 10).
- 2) Annual System Inspection – This inspection must be made every 12 calendar months (see Section 3.6, page 11).
- 3) If Damage or Deterioration is Suspect - The operator should immediately remove the helicopter from service if damage or deterioration is suspect. The operator should return the helicopter into service only after it is conclusively determined that the equipment is safe for aviation operations. This manual outlines only the most general repair and replacement of components. For repair that requires more extensive technical data, proper engineering substantiation of the project must be made. Engineering data should include an accompanying form 8110.3 with the appropriate authorized area(s) approved.

3.5 Initial System Inspection

The Initial System Inspection must be made after the flight data monitor system installation and prior to placing the flight monitor system into service. For the Initial System Inspection:

- 1) Verify that all items in installation drawing 20-0109-01 have been completed.
- 2) Locate helicopter outside of hanger to allow for GPS position fix.
- 3) Verify that Memory Chip is in Monitor Unit (see Section 3.2, item F).
- 3) Turn on helicopter electrical master switch and verify that FDMS circuit breaker on the LH Aux, RH Aux or Main Circuit Breaker Panel.
- 4) Check LED light on Monitor Unit. Blue light indicates system is booting (starting up). Green light indicates system is operating. Operate system for at least 5 minutes with Green light on. The flight data monitor system installation may be placed into service.

As soon as practical, the operator should:

- 5) Remove Memory Chip as outlined in Section 3.2, item E. Download data as outlined in Appareo Systems Playback Utility User's Guide document 600890-000006 and Configuration Tool User's Guide 600890-000004. Verify that audio, video and position data is accurate.
- 6) Reinstall Memory Chip as outlined in Section 3.2, item F.

3.6 Annual System Inspection

The Annual System Inspection must be made every 12 calendar months. For the Annual System Inspection:

- 1) Remove the Monitor Cover as outlined in Section 3.2, item B.
- 2) Visually inspect components for damage such as cracked or broken surfaces, dented or bent components, etc.
- 3) Inspect wiring and connectors for damage and security.
- 4) Unplug connectors and inspect for corrosion. Reinstall connectors.
- 5) Reinstall the Monitor Cover.
- 6) Perform the Initial System Inspection, items 1) through 4) from Section 3.5.

3.7 System Status Indication

The Monitor Unit has numerous internal self test features. The Monitor Unit has an LED light to indicate current system status.

LED Light	System Status
Blue	Booting (software starting up)
Green	Operating normally
Red	System Fault
Light Off	Power interruption

3.8 System Troubleshooting

Problem – Monitor Unit LED light is red.

Probable Cause	Possible Remedy
Monitor Unit fault.	Contact Appareo (see Section 1.1 for contact information)

Problem – Monitor Unit LED light is off.

Probable Cause	Possible Remedy
Power Interruption.	Verify that FDMS circuit breaker is set
	Verify voltage on pin 4 of P1 connector has 28 VDC power

Problem – FDMS circuit breaker trips (Do not reset circuit breaker while flying).

Probable Cause	Possible Remedy
Power Surge or Short Circuit.	Check wiring for continuity (see Section 3.9 for Wiring Diagram)
	Replace circuit breaker if it is determined that trip is not due to excess amperage.

