

# USER MANUAL

## Aircraft Interface Device

### Rosemount Aerospace Inc. Model 8730L Series

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**NOTE:** References to the company in this document will be made as Rosemount Aerospace Inc. (RMTAERO).

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## Revision History

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04	2.5	Updated antenna recommendations with gain limits	SISMN064413
	3.3.3	Added instructions for retrieving R&TTE DoC	
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	2.5	Updated antenna info	
	Table 2	Updated radio information	
06	2.5	Updated antenna info	SISMN067934

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# 1 ABOUT THIS DOCUMENT

The 8730L Series Aircraft Interface Device (AID) provides an interface between various aircraft avionics systems and nontraditional avionics equipment such as Electronic Flight Bags (EFB), In-Flight Entertainment (IFE) Systems, broadband communications systems (cellular, Wi-Fi) or onboard network servers; providing both a hardware and software firewall protecting the critical aircraft systems against any adverse effect from the interfacing nontraditional equipment.

The AID incorporates a variety of industry standard interfaces; including Ethernet, ARINC 429, ARINC 717, RS-232, RS-422/485, USB, and Discrete inputs/outputs. The AID also provides a removable mass data storage device enabling local data storage to hosted applications. An optional embedded cellular or Wi-Fi radio using remote antennas is available.

The AID incorporates a Linux operating system running on a PowerPC based micro-processor utilizing DDR3 memory. Software supports avionics interface data reception, transmission, concentration, and recording. Access to this data is provided to locally hosted or remote equipment applications via a built-in ARINC 834 server.

## 1.1 Purpose

This Users Manual provides an overall guide to the 8730L AID.

## 1.2 Applicable Documents

The following specifications, drawings, and publications, of latest issue when not specified, form a part of this document to the extent specified herein.

**Table 1: Applicable Documents**

<b>Rosemount Aerospace Inc.</b>	
<b>Document No.</b>	<b>Document Title</b>
8730L1	Specification Control Drawing for the AID
<b>Industry Standards</b>	
<b>Document No.</b>	<b>Document Title</b>
ARINC 429	Aircraft Mark 33 Digital Information Transfer System
ARINC 664	Aircraft Data Network
ARINC 717	Flight Data Acquisition and Recording System
ANSI/TIA/EIA-232-B	Interface between data terminal equipment and data circuit terminating equipment
ANSI/TIA/EIA-422-B	Electrical Characteristics of balanced digital interface circuits
ANSI/TIA/EIA-485-B	Electrical characteristics of generators and receivers for use in balanced digital multipoint systems

### 1.3 Abbreviations and Acronyms

AID	Aircraft Interface Device
ARINC	Aeronautical Radio Incorporated
DDR3	Double Data Rate type 3 Synchronous Dynamic Random Access Memory
DoC	Declaration of Conformity
EFB	Electronic Flight Bag
ICD	Interface Control Document
IFE	In-Flight Entertainment
lbs	pounds
SIM	Subscriber Identity Module
USB	Universal Serial Bus
VDC	Voltage - direct current

## 1.4 Terms and Definitions

- **Qualification** — Demonstrates that the implementation meets the requirements and is suitable for operation in the airplane.
- **Shall** — Expresses a binding requirement.
- **Should/May** — Expresses a recommended or allowed action.
- **Validation** — Identifies that the requirements for a product are sufficiently correct and complete.
- **Verification** — Identifies that the implementation has been evaluated to determine that all design requirements have been met.
- **Will** — Expresses a declaration of intent.

## 2 AIRCRAFT INTERFACE DEVICE (AID)

### 2.1 AID Overview

The 8730L AID has the following external features as shown in Figure 1:

- J1, 37-pin D-sub connector providing interfaces to the following: Aircraft +28V power, Chassis Ground, ARINC 664 Ethernet 10/100 Base T, ARINC 717 Harvard Bi-Phase receiver, ARINC 429 Bipolar receivers, ARINC 429 Bipolar transmitters, RS-232, and discrete inputs
- J2, 37-pin D-sub connector providing interfaces to the following: ARINC 664 Ethernet 10/100/1000 Base T, ARINC 429 receivers, ARINC 429/717 Bipolar receiver, ARINC 429 Bipolar transmitters, and discrete inputs
- J3, 50-pin D-sub connector providing interfaces to the following: ARINC 664 Ethernet 10/100/1000 Base T, ARINC 429 receivers, ARINC 429/717 Bipolar receiver, ARINC 429 Bipolar transmitters, RS-422/485, USB, discrete inputs, and discrete outputs
- Access Cover for removable CFast Storage device and SIM card (SIM card supports cellular capability).
- Three (3) external antenna connectors (for Wi-Fi or cellular capability)
- Mounting provisions
- Weight: 2.5 lbs max for base unit, add 0.2 lbs for each cellular and/or Wi-Fi, add 0.1 lbs for CFast, add 0.15 lbs for 8730L1-5 model.

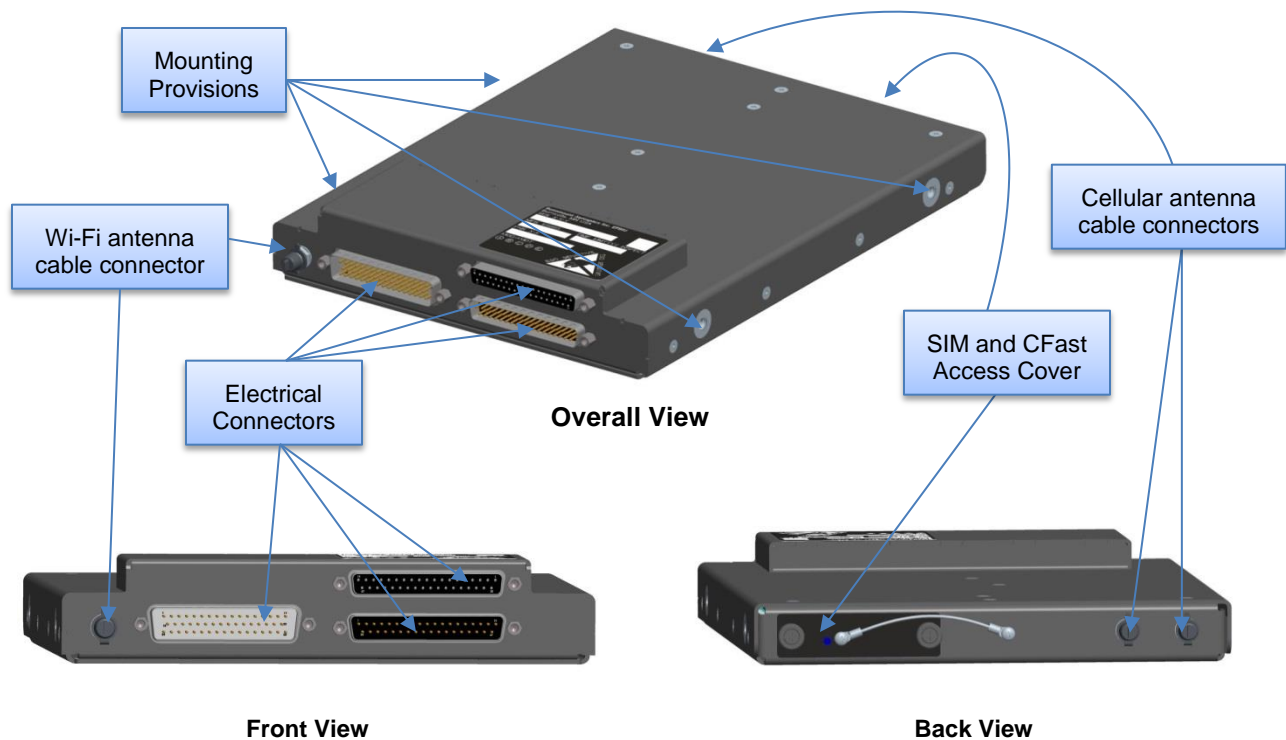


Figure 1: 8730L Series AID



There are five defined model configurations of the AID, each supporting different wireless needs. Model configuration is accomplished during factory build through the installation radio module internal to the AID enclosure.

**NOTE:** *The radios are not accessible and should not be removed by the User.*

**Table 2: Model Configurations**

Manufacturer	Model	Wireless Communications	Radio Module
UTC Aerospace Systems	8730L1-1	No Wireless (Base model)	None
UTC Aerospace Systems	8730L1-2	Cellular (LTE in North America; 2G/3G elsewhere)	Sierra Wireless MC7354
UTC Aerospace Systems	8730L1-3	Cellular (LTE in Europe, Middle East, Africa; 2G/3G elsewhere)	Sierra Wireless MC7304
UTC Aerospace Systems	8730L1-4	Wi-Fi (802.11 a/b/g/n)	Advantech EWM-W158F
UTC Aerospace Systems	8730L1-5	Cellular (LTE in North America and EMEA) and Wi-Fi (802.11 b/g/n)	Sierra Wireless MC7455 and SparkLAN WUBA-171GN

A SIM card can be installed or removed through the Access Cover on the back of the AID.

The AID has the capability to allow the user to install a CFast card; a solid-state non-volatile data storage device. The CFast card is a separate LRU (not part of the standard AID configuration) and is accessible through the Access Cover on the back of the AID for easy removal or insertion. CFast model number 8732D1-1 is available from UTC Aerospace Systems and has been qualified to operate within the AID operating environment.

**NOTE:** *The CFast and SIM card are not considered to be hot-pluggable. Ensure the AID is powered off prior to inserting or removing these devices from the AID.*

**NOTE:** *If the Access Cover on the back of the AID is removed for any reason, reinstall the cover prior to using the AID in its intended function.*

## 2.2 Mechanical Interfaces

The AID provides mounting provisions (or holes) on the sides of the unit as shown in Figure 1. The 8730L AID is mounted in the aircraft as a fixed device; it is not movable by the user. The mounting provisions are designed to interface with a simple U-bracket mounting provision with holes for screws or captive fasteners on the two sides. Two L-brackets are another potentially simple solution, one on each side.

The AID is cooled by natural convection and by conduction through the mounting provisions. Sufficient clearance must be provided to permit air flow in the installation. The installation should also be designed to provide a path for heat to flow through the mounting bracket into the structure.

## 2.3 Electrical Interfaces

The AID electrical interfaces are made through one 37-pin D-sub pins, (J1), one 37-pin D-sub socket, (J2), and one 50-pin D-sub pins (J3). The Wi-Fi antenna cable connection and the cellular antenna cable connections are made with SMA connectors.

The AID provides a chassis ground electrical bonding path through a metal surface contact around its mounting holes. In addition, the AID bonds its connector shells to local chassis ground and provides a chassis ground pin in connector J1. One or more of these points should be connected to the aircraft chassis ground through a low impedance connection path.

## 2.4 Power Requirements

The AID requires 28 VDC aircraft power as defined in Table 3. Circuit breakers should be chosen based on max current as shown.

**Table 3: Power Supply**

Power Characteristic	Value
Voltage	+28 VDC nominal (18 VDC – 32.2 VDC range)
Current (typical)	0.71A @ 28VDC
Current (max continuous)	0.9A @ 28VDC
Inrush Current (max)	6A @ 28VDC (<100ms)
Power Consumption (typical idle)	20W
Power Consumption (max continuous)	25W

## 2.5 Wireless Antenna Recommendations

Attached cellular antennas should be Laird part number DBA6927C1-xxxxx. Alternate antennas with similar performance may be suitable. Gain should not exceed 0.5 dBi at 698-960 MHz and 2.2 dBi at 1710-2700 MHz. Cellular antennas must be connected through a coaxial cable of at least 20cm length. It is recommended that the coaxial cable attenuation characteristic is similar or better than Times Microwave Systems Maxgain-200.

Attached Wi-Fi antenna should be Laird part number MAF94271. Alternate antennas with similar performance may be suitable. Gain should not exceed 2.1 dBi at 2.45 GHz, 2.4 dBi at 4.9 GHz, 2.6 dBi at 5.25 GHz, and 3.4 dBi at 5.875 GHz. The Wi-Fi antenna can be placed directly on the AID, but remote locations through a high performance coaxial cable may offer improved performance depending on location. Maxgain-200 or better cabling is recommended.

Guidelines for placement of the antennas:

- Antennas should be located in an area with apertures to allow transmission – that is, not a fully enclosed metal structure.
- Maximizing spatial and orthogonal diversity is desired. Locate the antennas not near one another and rotated 90° relative to one another.
- Strive for at least 1 foot away from metal structure.
- If a mounting bracket is used to retain the radiating element portion of the antenna(s), it should be non-metallic and RF-transparent. Avoid carbon based dyes or paint that can hinder RF transmission.
- Install antennas in a location where 20 cm is normally maintained between the transmitter's radiating structures and the body of nearby persons.

### 3 CERTIFICATIONS

#### 3.1 DO-160

The 8730L AID has been certified to operate within the following environmental conditions.

Test Description	DO-160G Section	Test Category
Temperature and Altitude	4.5	Operating Low Temp., -40°C, Modified Cat B2
	4.5	Operating High Temp., +55°C, Modified Cat B2
	4.5	Short-Time Operating Low Temp., -40°C, Modified Cat B2
	4.5	Short-Time Operating High Temp., +70°C, Cat B2
	4.5	Ground Survival Low Temp., -55°C, Cat B2
	4.5	Ground Survival High Temp., +85°C, Cat B2
	4.6.1	Steady State Altitude, 25,000 ft. Cat B2
	4.6.2	Decompression, 51,000 ft. Cat A1
	4.6.3	Overpressure, 170kPa (-15,000 ft.), Cat A1
Temperature Variation	5	Category B
Humidity	6	Category A    Category B
Operational Shocks, Crash Safety	7	6g 11ms Shock Cat B
		20g 11ms Crash Safety Impulse Cat B
		20g Crash Safety Sustained Cat B
Vibration	8	Category S, Curve C    Category U, Curve G
Fluid Susceptibility	11	Category F, as limited to a subset of fluids
Sand and Dust	12	Category S
Fungus Resistance	13	Category F
Magnetic Effect	15	Category Z, less than 0.3 m
Power Input	16	ZXX
Voltage Spike	17	A
Power Supply Audio Frequency Conducted Susceptibility	18	Z
Induced Signal Susceptibility	19	ZC
RF Conducted Susceptibility (10kHz – 400MHz)	20	T
RF Radiated Susceptibility (100MHz – 8GHz)	20	T
RF Conducted Emissions (150kHz – 152MHz)	21	M
RF Radiated Emissions (100MHz – 6GHz)	21	M
Lightning Indirect Effects	22	A1C1X
Electrostatic Discharge	25	A

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## 3.2 DO-254 and DO-178C

The AID is developed in accordance with Design Assurance Level E per RTCA/DO-254 and DO-178C.

## 3.3 Wireless Regulatory Compliance And Industry Certification

The AID has the following regulatory and industry approvals.

### 3.3.1 FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Consult the SCD 8730L1 for model-specific FCC ID numbers.

### 3.3.2 Industry Canada

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Consult the SCD 8730L1 for model-specific IC ID numbers.

### 3.3.3 CE

This equipment is intended to be used as an Aircraft Interface Device which includes wireless communication.

Hereby, Rosemount Aerospace Inc., declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.



A complete Declaration of Conformity (DoC) is available from UTC Aerospace Systems upon request. Please contact your Customer Service Representative.

### 3.3.4 PTCRB

The 8730L1-2 AID is PTCRB certified.