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# Flightcell Versatile Audio Module (VAM)

For use with Iridium 9505, 9505A, 9555 and 9575 satellite phone  
cradles

## Installation and Configuration Manual

Flightcell VAM Installation and Configuration Manual

MAN\_IDP\_001

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# 1 Introduction

The VAM is intended as a general-purpose device that can be used to interface audio devices that are not directly compatible with each other. The application for which the module was originally conceived is the connection of an aviation headset to a Flightcell Iridium Sat phone cradle; this application is used as an example later in this document and this is reflected in the terminology that is used.

As well as matching impedance and voltage levels, the VAM is capable of providing microphone bias voltage (which is typically required when connecting to a high-impedance headset), galvanic isolation between input and output, and sidetone.

## 2 Specification

### 2.1 Electrical

Parameter		Value
Input Voltage		12 – 32VDC
Power Supply Current		~250mA @ 28VDC
ICS to VAM Audio	Input Levels	20mVrms to 3Vrms, adjustable 775mVRMS nominal
	Input impedance	600Ω
Microphone bias voltage		9.8V via 2.2kΩ
VAM to ICS Audio	Output levels	Up to 5Vrms (into 150 Ω), adjustable 775mVrms nominal
	Output impedance	600Ω
Cradle to VAM Audio	Input Levels	20mVrms to 3Vrms, adjustable 775mVrms nominal
	Input impedance	600Ω
VAM to Cradle Audio	Output levels	Up to 3Vrms (into 600 Ω), adjustable 775mVrms nominal
	Output impedance	600Ω

### 2.2 Housing materials

The VAM end plates are die cast type 380 aluminium passivated with a chromate conversion coating to maintain electrical conductivity between mechanical components and prevent corrosion. The main extrusion is 6063 aluminium with a clear anodized finish.

### 2.3 Dimensions

	Metric	Imperial
Width	62mm	2.44"
Height	34mm	1.34"
Depth	104mm	4.1"

### 2.4 Weight

Metric	Imperial
175g	6.18oz

## 3 Installing the Flightcell VAM

### 3.1 Mounting the VAM unit

The VAM should ideally be mounted in a location that allows access to the level adjustment potentiometers (located behind the rubber plug).

Refer to the following mechanical drawing (latest version is available from the Flightcell website at <https://www.flightcell.com/resources>) for dimensions and mounting details of the VAM:

- DRW\_IDP\_004\_VAMMechanicalAssembly

CAD solid model files are also available on request from Flightcell International.

### 3.2 Wiring the VAM installation

Wiring diagrams for the Flightcell VAM are provided in the Interconnect Documents, before starting the installation ensure you have the latest versions of all documents (available from the Flightcell website at: <https://www.flightcell.com/resources>):

- WRL\_IDP\_001\_VAMICDWithD38999Cradle for installations with D38999 Iridium cradles.
- WRL\_IDP\_002\_VAMICDWithD25Cradle for installations with DB25 Iridium cradles.

#### 3.2.1 Guidelines for fabricating wiring harnesses

All wiring should be carried out with aviation specification fireproof cable.

Screened cable should be used where indicated in the wiring diagrams. Where cable screen connections are not explicitly shown, they should be left un-terminated.

The following minimum wiring specification is recommended:

- Power supply - 22 AWG stranded (0.325mm<sup>2</sup>)
- Other cabling - 24 AWG stranded (0.205mm<sup>2</sup>).

##### 3.2.1.1 Grounding and audio shield termination

The VAM provides a chassis ground connection on the primary connector. This can be connected to a local aircraft chassis ground point if required.

## 3.3 Connecting to the aircraft ICS/audio panel

### 3.3.1 Audio connections to ICS/audio panel

It is recommended that the VAM is connected to a spare radio position on the audio panel. AUDIO FROM VAM HI is connected direct to the ICS audio input, and its levels adjusted using RV3 (SPK).

### 3.3.2 MIC connections from ICS/audio panel to the VAM

The VAM is designed to be installed in aircraft systems with high impedance audio systems. Most (but not all) civil aircraft operate high impedance (electret) microphone systems. Most (but not all) military aircraft operate low impedance microphone systems.

There are several options for connecting the VAM into the aircraft audio panel/ICS. The way in which the VAM is connected will depend on your system configuration and operational requirements.

As the Iridium satellite phone is full duplex, it is preferable to use the VAM on a hot mic connection, rather than PTT. The VAM will typically be installed in one of the following ways:

#### 3.3.2.1 Connecting direct to a headset microphone line:

The MIC TO VAM HI line is spliced to one or more headset microphone inputs on the audio panel. As these microphone inputs have mic bias provided by the audio panel, the VAM does not need to provide the mic bias.

The way this is configured will depend on how many headsets are to have access to the VAM/Iridium cradle:

- If only the pilot is to use the VAM, its MIC TO VAM HI is connected only to the pilot's microphone line.

- If more than one microphones need to have access to the VAM, an external switch is required to select the active microphone input to MIC TO VAM HI.

### ***3.3.2.2 Connecting to a cell phone port on the audio panel:***

Some audio panels have a dedicated cell phone port, which provides a convenient connection option. The MIC TO VAM HI line is connected to the audio panel's cell phone output. Please consult your audio panel installation manual for more details.

Depending on the way this connection is configured in the audio panel, this option may require the user switch the mic away from the radio when on a call.

See the VAM wiring diagrams for an example of this configuration.

### ***3.3.2.3 Connecting to a spare transceiver position on the audio panel:***

On aircraft with separate audio control panels at each crew position, this option enables crew to use the VAM and connected phone individually on demand.

On aircraft using high impedance (electret, dynamic or carbon) microphones, a bias voltage is commonly required on MIC HI lines to the audio panel, in order to energize the user's microphone when using the VAM. If mic bias is required, the biased MIC TO VAM connections must be used (refer to pin out listing in section 4 for details on biased/unbiased mic connections).

## **3.4 Connecting to the aircraft power supply**

The VAM unit and Iridium cradle require aircraft DC power. Operating range is 12-32VDC.

It is recommended that the VAM be connected to the emergency (primary) power bus on the aircraft.

When operating on a nominal 28V supply, circuit breakers or fuses of the following rating should be used between VAM system components and the power supply:

- A 1-amp circuit breaker/fuse is recommended to protect a Flightcell VAM and Iridium phone cradle.

### **3.4.1 Iridium Cradle Power Supply**

The VAM unit provides a power pass through on pins 2 and 10; so that the Iridium cradle (or other attached equipment) may be powered from the same supply without the need to splice cables (refer to pin out listing in section 4 for details).

## 4 Connector pin outs

Connector type: DA15M

Mating part: M24308/2-2F (or equivalent)

Pin No	Function	Direction	Notes
1	DC SUPPLY POSITIVE	Power	DC power supply
2	DC SUPPLY POSITIVE	Power	Feed through to Iridium cradle
3	CHASSIS GND	Ground	Internally connected to VAM Chassis
4	MIC TO VAM LO (BIASED)	Input	Biased mic input
5	MIC TO VAM LO	Input	Unbiased mic input
6	AUDIO FROM VAM LO	Output	Return for audio output to ICS
7	AUDIO FROM CRADLE LO	Input	Return for audio input from Iridium cradle
8	AUDIO TO CRADLE LO	Output	Return for audio output to Iridium cradle
9	POWER GROUND	Power	Return for DC supply
10	POWER GROUND	Power	Feed through to Iridium cradle
11	MIC TO VAM HI (BIASED)	Input	Biased mic input
12	MIC TO VAM HI	Input	Unbiased mic input
13	AUDIO FROM VAM HI	Output	Audio output to ICS
14	AUDIO FROM CRADLE HI	Input	Audio input from Iridium cradle
15	AUDIO TO CRADLE HI	Output	Audio output to Iridium cradle
D15 shell	CHASSIS GND	Chassis	

## 5 Configuration

The headset output from the VAM is capable of driving a headset with an impedance of between 8 and 600Ω. The output is balanced line and galvanically isolated.

The audio input and output on the sat phone side are both of 600Ω nominal impedance and are balanced line and galvanically isolated.

The VAM has an internal power-present LED indicator mounted in the end panel next to the pre-set adjustments.

### 5.1 Level adjustment

Three level adjustments are provided – these are accessible by removing the dust cover plug (labelled SIM) in the front of the enclosure and can be adjusted using a small blade or cross point screwdriver. The pre-sets are labelled on the circuit board as 'MIC' (RV1), 'SPK' (RV3) and 'ST' (RV2).

The Mic pre-set adjusts the level of the mic audio being sent from the VAM to the sat phone cradle. Spk adjusts the level of the sat phone speaker audio being transmitted from the VAM to the ICS. ST adjusts the level of the sidetone audio provided by the VAM on the ICS MIC/Audio connection.

If sidetone is not required, the 'ST' pre-set should be set to minimum. The other level adjustments should be set as appropriate for the equipment that is connected; the design is such that setting both to approximately halfway will give levels that are suitable for an aviation headset and a Flightcell sat phone cradle.

## 6 Warranty and contact details

### 6.1 Limited warranty for your Flightcell VAM

Flightcell International Ltd's quality products are proudly designed and manufactured to the highest standards in New Zealand.

Your VAM is warranted for two years from date of sale. This warranty covers Flightcell manufactured items only. Any ancillary items may be covered by individual manufacturer warranties.

The warranty is void if any labels are removed or if it is determined that your VAM has been:

- Connected to a power supply delivering more than 32 Volts;
- Connected with reverse polarity;
- Installed in direct contravention to the guidelines outlined in the technical installation manual;
- Physically damaged, or a fault has occurred due to the product being used beyond what is considered normal use, causing unusual deterioration of the product.

If the product is deemed to be faulty or in need of repair, please complete a Returned Materials Authorization form at <https://www.flightcell.com/support> or contact Flightcell International at the address below.

### 6.2 Flightcell International contact details

Flightcell International Ltd

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## 7 Version history

Version	Date	Author	Change note number	Description
1.0	11 August 2010	F. Twissell	FCN0107	Document created.
1.1	16 August 2010	F. Twissell	FCN0110	Added pin out information.
1.2	28 March 2011	F. Twissell	FCN0173	Amended installation drawing.
2.0	14 April 2014	J. Glasgow	FCN0600	Revised for updated design in new enclosure.
2.1	29 October 2018	M. Eddy	QS-348	Updated website URLs.