

Inflight Peripherals Limited

Integrated Noise Cancelling Audio Module – Rapid
Fit [INCAM/RF]

Technical Interface Specification

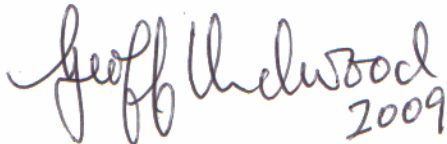
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Date: 20th January 2009

Prepared by: G.P.Underwood

Signed:

A handwritten signature in cursive script that reads "Geoff Underwood" with "2009" written below it.

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1. Introduction

The Integrated Noise Cancelling Audio Module/Rapid Fit [INCAM/RF] is an ARINC style remote jack module which contains the control circuitry to drive a set of Low Cost Active Noise Cancellation Headphones.

The INCAM is designed for use with Inflight Entertainment Systems on passenger aircraft and is designed to install into seat arms where there is a standard size oval cut-out, conforming to ARINC specifications.

This specification defines the basic electrical and mechanical interfaces for the INCAM/RF. Detailed headphone interface and performance information is available on request.

2. Function

The INCAM/RF will allow the connection of Type D2 and type A2/B2 headphones, or Type D1 and type A1/B1 headphones per ARINC Specification 628, Pt 2, Att. 8. (see Fig 1)

Type D1 & D2 headphones contain microphones and speakers, and when connected to the INCAM/RF, provide active suppression of ambient cabin noise. Connection is via a two pin stereo connector.

Type A1/B1 & A2/B2 headphones contain only speakers and do not provide any active noise suppression. A1/B1 headphones connect via a single pin stereo connector. A2/B2 headphones connect via a two pin mono connector.

The INCAM/RF operates in two modes. When an ARINC type D1 or D2 headphone is connected to the module, the INCAM/RF automatically switches into Mode 1 with the active noise cancellation circuit fully operational. When an ARINC Type A1/B1 or A2/B2 headphone is connected to the device the INCAM automatically switches to Mode 2. In this mode the noise cancellation electronic circuitry is bypassed, and the headphones operate without any noise cancelling.

If a fault occurs whilst using Type D1 or D2 headphones (such as excessive feedback), the INCAM senses this condition and switches off the Noise Cancelling circuitry and reverts to Mode 2.

In the event of power failure, the INCAM will not operate in either Mode 1 or Mode 2.

3. Technical Specification

3.1 Dimensions: 28.5 x 27 x 21.3 [Fig 3]

3.1.1 Installation: Refer to Section 5 & Fig 5

3.2 Mass: 25.5g (max)

3.3 Power supply: 13.5V DC +/- 1.5V

3.3.1 Circuit Protection: It is recommended that the INCAM power supply is limited to a maximum source current of 100mA. If connected via a fuse, then the recommended fuse rating shall be: 110mA anti-surge.

3.4 Current: Typ. Max operating:30mA, Standby: 8mA, Max:100mA,

3.5 Input connection: JST Connector model SMR-type [Fig 2]

3.6 Source Impedance The INCAM/RF presents a high impedance (>75,000 ohms) at the audio input.

3.7 Input Power Max. Audio input power 100mW

3.8 Output connection: p/n 1067-2xx-y & 1067-3xx-y support Type D1-1.
p/n 1067-5xx-y & 1067-6xx-y support Type D1-2 & A1/B1 headphones.

p/n 1067-1xx-y & 1067-4xx-y support Type D2 & A2/B2 headphones
[see Fig 1]

Headphone impedances 32 - 300 Ohms are supported.

3.9 Noise cancellation:

3.9.1 Microphone Input Electret condenser. Bias voltage 6V through 4.7K ohm resistor.

3.9.2 Attenuation range 50 Hz to 1.5 kHz

3.9.3 Attenuation Performance. Better than 12 dB between 150 Hz and 400 Hz

3.9.4 Frequency response +/-6dB ref. at 1000 Hz over range 350Hz - 3k Hz (in Mode 1)

3.9.5 Distortion <1% at 100 dB SPL, 100-600 Hz in active or passive modes

4 Headphone Design Guidance

This section provides limited guidance on requirements for compatible headphones to allow compatibility with INCAM. Good NC performance is gained through a combination of high quality headset component selection and good acoustic design, which is not the subject of this design guide. Detailed information is available upon request.

4.1 Microphone Placement

For the Headphone to operate correctly the pickup microphone must be positioned adjacent to the speaker, preferably as close to the ear as possible. See Figure 3.

(Note: Headphone arrangements whereby the pickup microphone is sensing sound externally to the ear cup will not work with INCAM)

4.2 Additional Filtering

To improve the performance of the headphones a passive phase lag filter should be incorporated into each earcup. This circuit is NOT ESSENTIAL for operation of the headphones. This filter circuit is shown in Figure 4 and allows the headphone performance to be optimised with the INCAM. The values of R2 and C1 may be calculated with reference to IFPL.

4.2.2 Optional Noise Cancelling On/Off control

The operation of the NC circuit can be controlled within the headset by means of an on/off switch placed in the microphone circuit on either the left or the right channel (A switch is NOT required in both channels). See Fig 4

5. Installation

The 1067 series INCAM/RF is intended primarily for installation within the arm of an aircraft passenger seat, and is designed to provide the aircraft passenger with a means to connect an electrical audio headset into the IFE System. As such, it is a necessary and fundamental requirement that the electrical connector socket (the Jack) is exposed for this purpose.

Due to the sensitive nature of such electrical connectors, it is necessary that the Remote Jack Module is installed in such a way as to minimise the possibility of water and other liquid penetration.

The RJM must not be installed with the electrical sockets in a horizontal orientation with the jack connectors facing upwards.

As far as is practical, the front face of the RJM shall be orientated in a vertical plane (see Fig 5)

For maximum reliability, it is recommended that the RJM shall be mounted on the end of the seat arm, although many installations do not allow this.

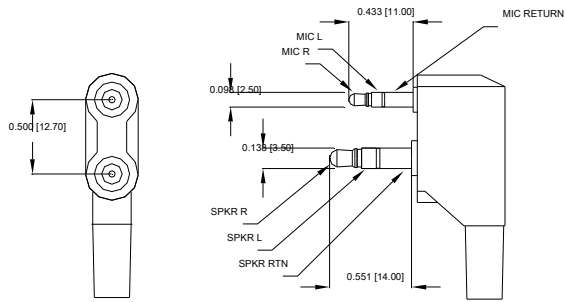
As stated, the RJM is designed for installation in a passenger seat and shall be generally classified for use in Category X installations per RTCA/DO-160. This may be either in a seat back, or in a seat arm as required. Both of these installations are considered to offer a degree of protection to the main body of the unit against liquid spillage and against falling water.

Where the RJM is installed in any location that is classified by the installer, seat manufacturer or aircraft manufacturer as "Category W" (exposed to falling water), then the installation shall include a protective shield that ensures that the main body of the RJM is protected from falling water (see fig 5)

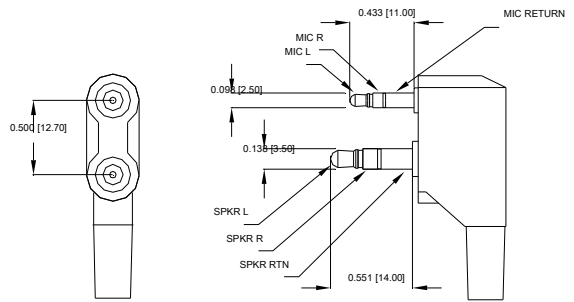
The 1067 series RJM is designed for rear mounting. It has no attachment points (fixing holes) and is designed to be held in place by a clip, bracket or strap, as required by the installer.

The RJM has an oval shaped part that is intended to fit into a similarly shaped cut-out in the mounting panel.

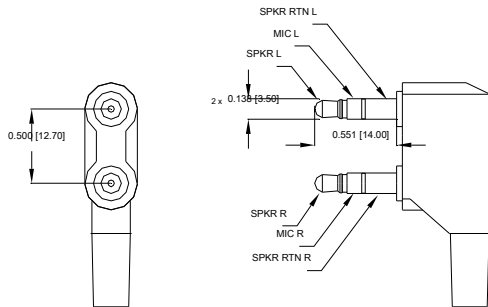
The recommended cut-out and panel thickness is shown in fig 5.



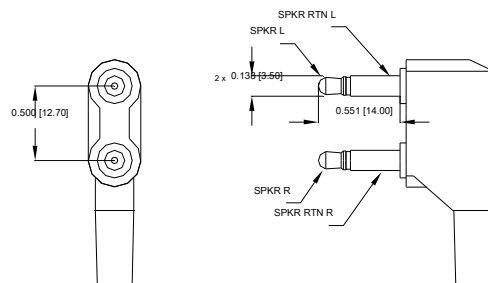
TYPE D1-1 2 PIN PLUG DETAIL
COMPATIBLE WITH: 1067-2xx-y SERIES
1067-3xx-y SERIES



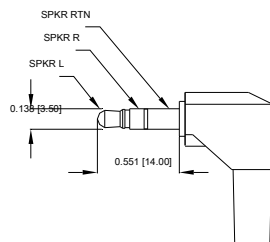
TYPE D1-2 2 PIN PLUG DETAIL
COMPATIBLE WITH: 1067-5xx-y SERIES
1067-6xx-y SERIES



TYPE D2 2 PIN PLUG DETAIL
COMPATIBLE WITH: 1067-1xx-y SERIES
1067-4xx-y SERIES



TYPE A2 AND B2 2 PIN PLUG DETAIL
COMPATIBLE WITH: 1067-1xx-y SERIES
1067-4xx-y SERIES



TYPE A1 AND B1 SINGLE PIN PLUG DETAIL
COMPATIBLE WITH: 1067-5xx-y SERIES
1067-6xx-y SERIES

FIGURE 1. HEADSET CONNECTOR COMPATIBILITY

FIGURE 2: OUTLINE DIMENSIONS

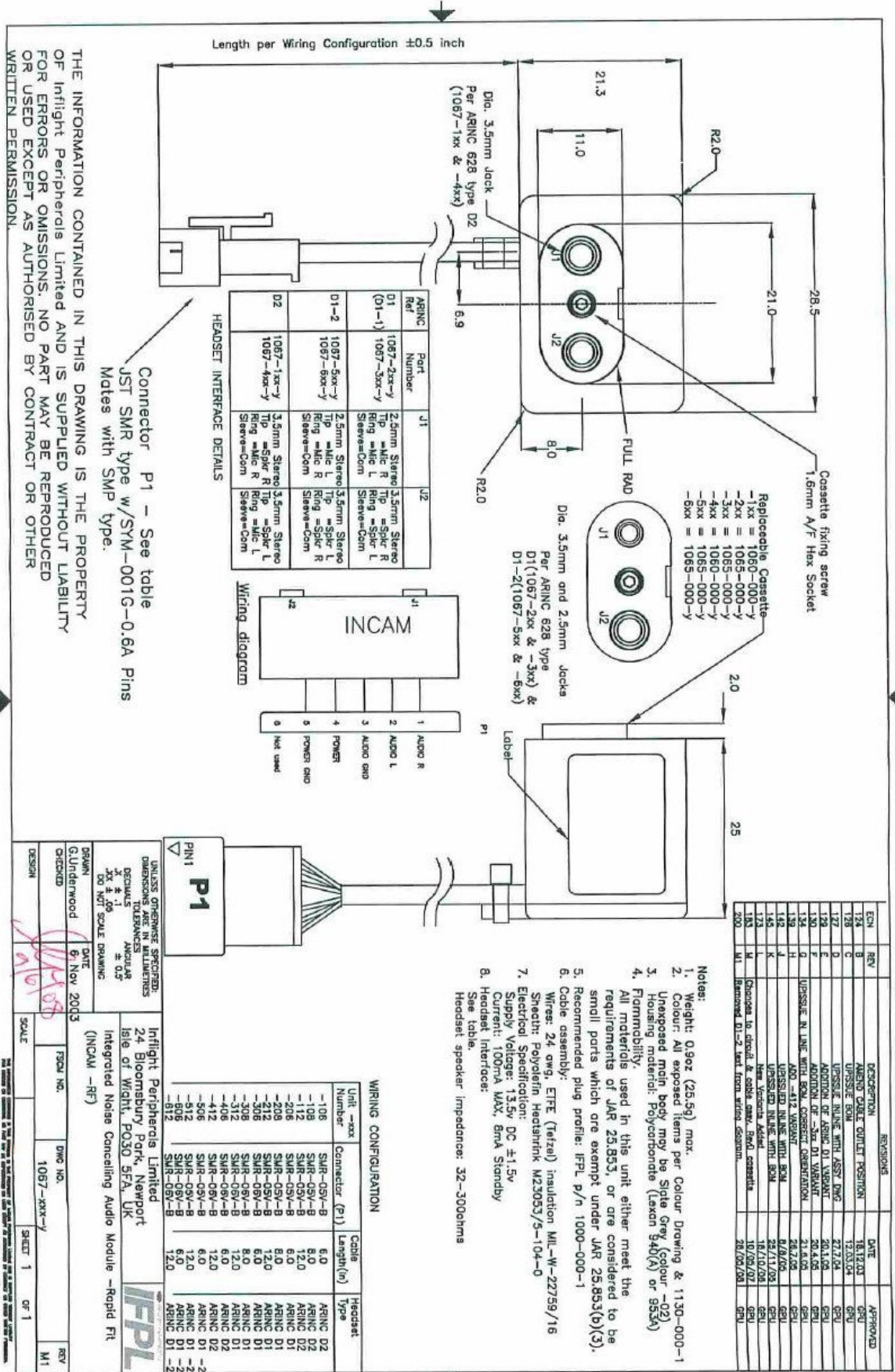
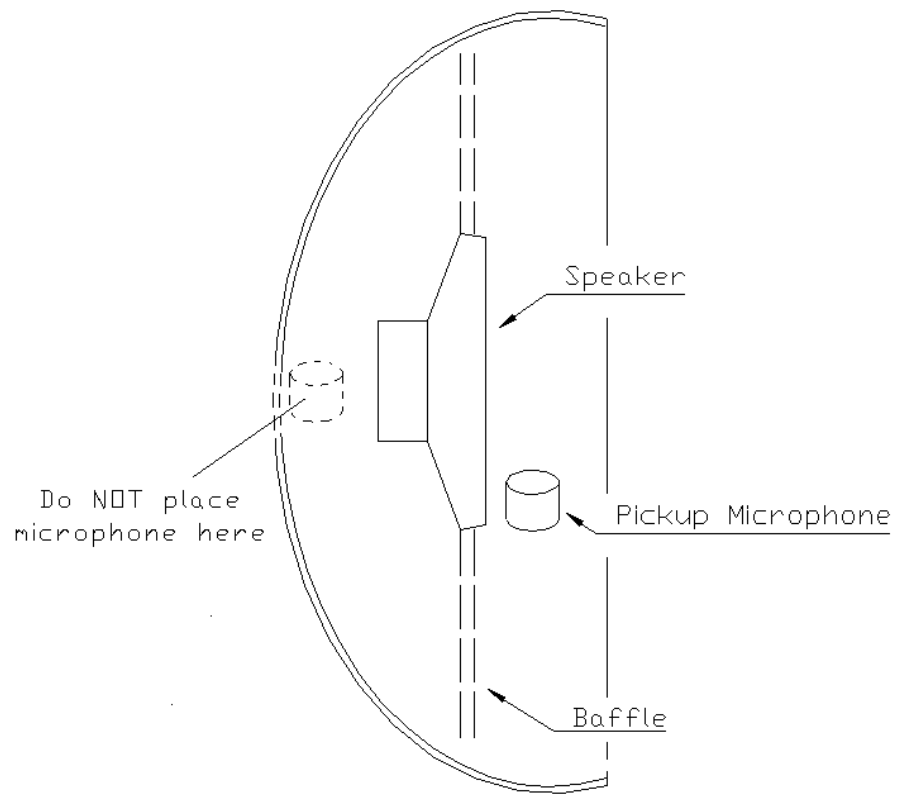
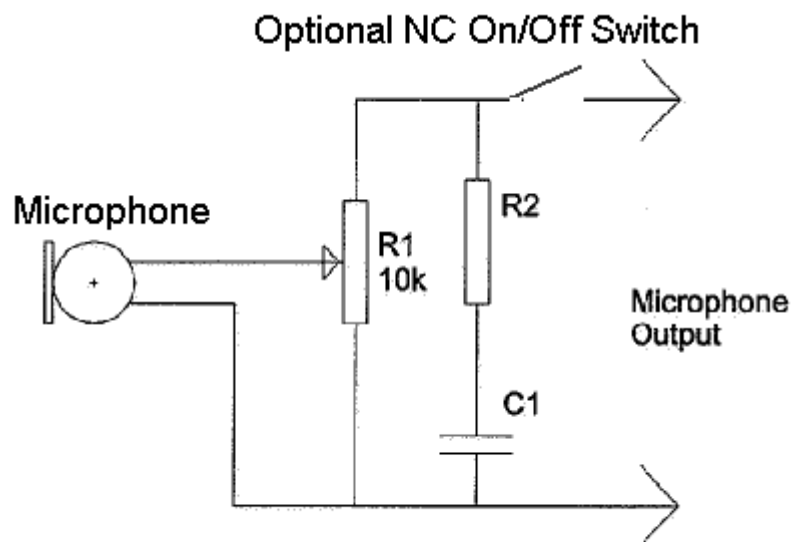


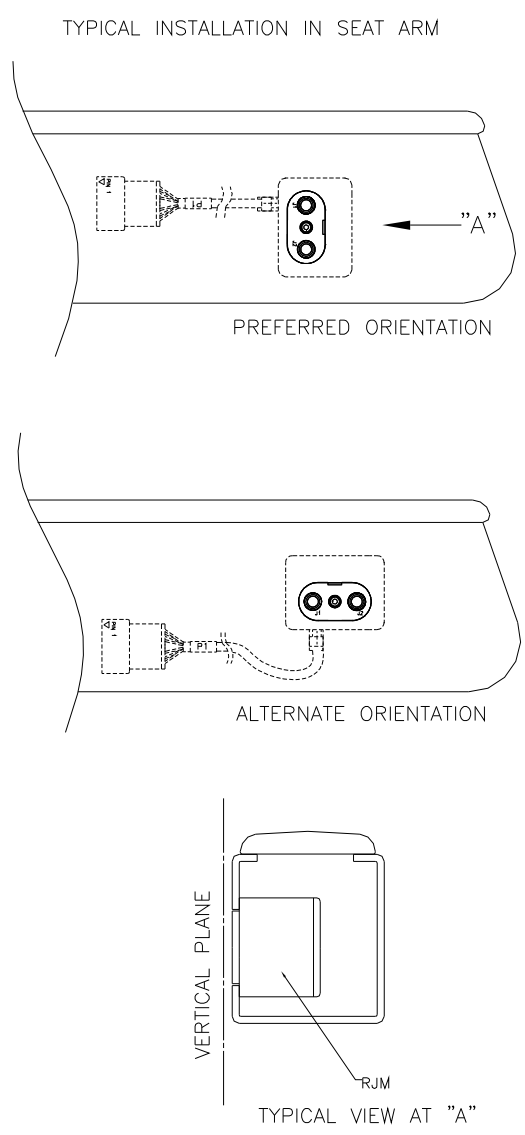
FIGURE 3: HEADSET GENERAL ARRANGEMENT



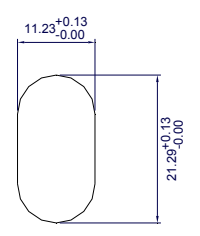
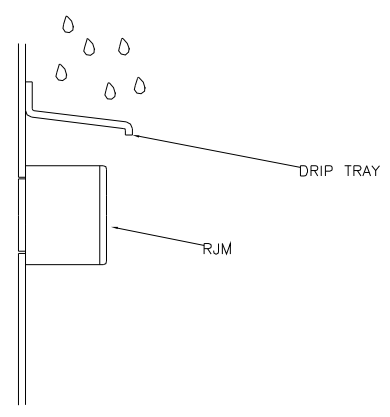
Headset General arrangement

FIGURE 4: FILTER CIRCUIT





TYPICAL INSTALLATION EXPOSED TO FALLING WATER (CATEGORY "W")



RECOMMENDED CUT-OUT
(PANEL THICKNESS 2.0mm)

FIGURE 5: INSTALLATION