CA-003
PN 106570-0003-XXXXX

Aircraft Cabin Audio Selector

Alto Aviation
86 Leominster Rd
PO Box 399
Sterling, MA 01564

Phone: 978.466.5992
800.814.0123
Fax: 978.466.5996
E-mail: tech@altoaviation.com

www.altoaviation.com

Revisions

Rev #	Date	Description
1	04/13/18	New Document

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Service Bulletin List

Service Bulletin Number	Subject	Manual Revision Number	Manual Revision Date

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1.0 GENERAL INFORMATION

1.1 Definitions

CMS	Cabin Management System
mA	milliamps (1 x 10-3)
OEM	Original Equipment Manufacturer
RMS	Root Mean Squared
VDC	Volts Direct Current
DSP	Digital Signal Processor
TSO	Technical Standard Order
EQ	Equalizer
PA	Passenger Address
LED	Light Emitting Diode
PTT	Push To Talk
COG	Center Of Gravity

1.2 Product Overview

The CA-003 is a line level cabin audio selector with 4 stereo inputs and a PA mute feature.

The cabin audio selector provides 6 line outputs that can be configured to drive 3 stereo amplifiers or zones. For control purposes there are 13 opto-isolated discrete logic inputs. These can be configured as cabin control, PA, and mute functions which are controlled by ground active circuits, often from keypads or relays.

The unit is fully configurable via a custom software interface. The unit is powered from 28VDC.

Figure 1: CA-003 Image

2.0 APPLICATION

The CA-003 interfaces with typical aviation control boxes, keypads, and cockpit equipment. The cabin audio selector is compatible with control signals that are ground active.

Up to 3 cabin zones are supported. Each zone has corresponding volume, source select, and mute controls. During a PA event the entertainment audio can be muted. Alternatively, one of the four sources can be replaced with PA audio and routed to the entertainment speakers during a PA event.

Configuration and diagnostic interface of the CA-003 can be accomplished via the RS-422 serial interface (on J5 connector.)

The cabin audio selector has indicator LEDs as shown in **Figure 2.** The power LED will glow Green to indicate the unit is powered. The Red indicates a fault condition. (Refer to 7.1 for detailed fault code information.) The Event Active LED shall glow blue to indicate that a discrete key line event is taking place.

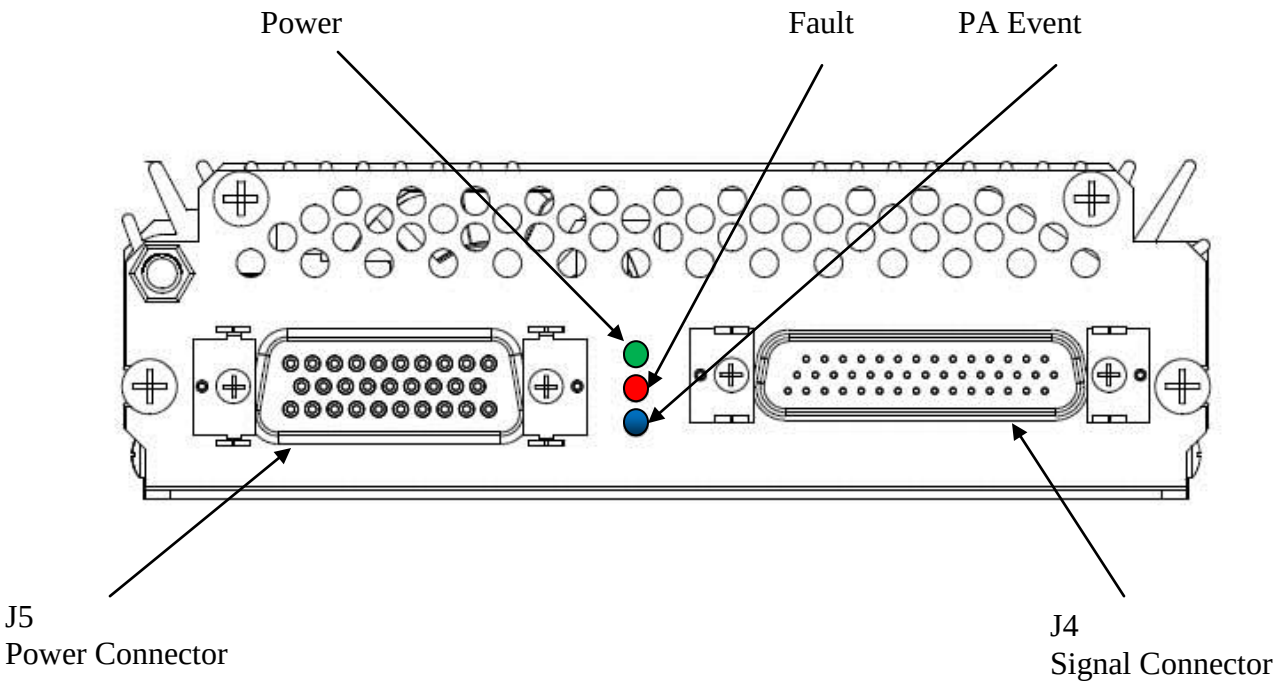


Figure 2: End Plate - Connector End

2.1 Full Block Diagram

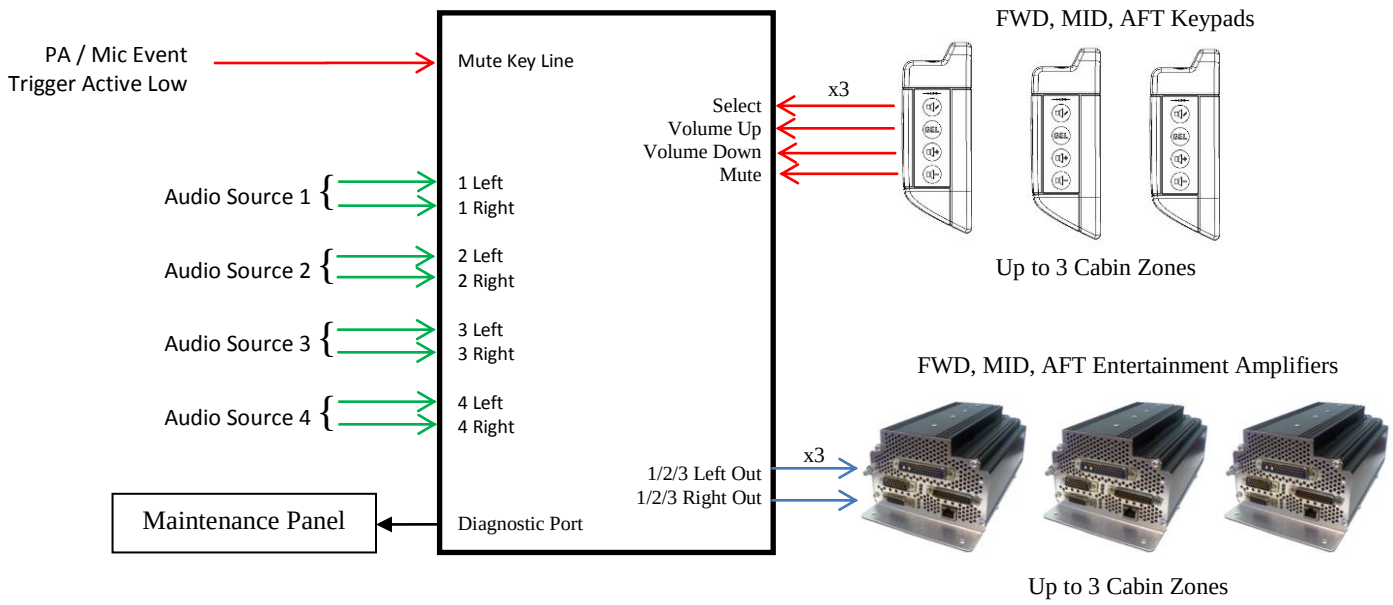
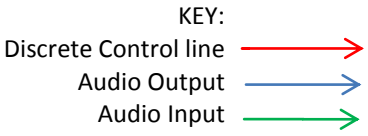


Figure 3: Full Block Diagram



3.0 INSTALLATION

3.1 General

The information in this section assists the installer of the unit. Conformity to the electrical wiring and mechanical mounting guidelines will help to ensure proper operation of the unit.

Review all information in this section before proceeding with the installation of the unit.

For assistance during installation please contact Alto using the following contact information:

Alto Aviation
86 Leominster Rd
PO Box 399
Sterling, MA 01564

Phone: 978.466.5992
800.814.0123
Fax: 978.466.5996
E-mail: tech@altoaviation.com

www.altoaviation.com

When connecting this unit to another manufacturer's product, consult the manufacturer's specifications and installation instructions pertaining to their equipment.

The product is qualified to TSO-C139a and RTCA/DO-214a. The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. The article may be installed only following 14 CFR part 43 or the applicable airworthiness requirements.

The software in this unit is certified to TSO-C139a at Design Assurance Levels E.

This unit is suitable for installation where the failure condition of the unit is considered to be 'No Effect'.

3.2 Unpacking and Inspection

Carefully open the packaging and remove the product. Visually inspect the unit for evidence of physical damage during shipment. Retain the packing materials and all documentation received with the unit. Verify that all components on the packing list have been received.

If the unit has been damaged during shipment, contact Alto. A claim must be filed immediately after unpacking. Alto will assign a RMA Number (Returned Material Authorization) and give instructions for shipment. Please use the original carton and packing materials for return shipping.

3.3 Mounting Considerations

The following should be carefully considered before installation.

Allow for a minimum of 1” air space around the unit and 2” air space at each end for proper operation and heat dissipation.

The unit should be located such that the lengths of wiring required for the audio inputs, speaker outputs, and power supply are minimized.

Allow sufficient room to connect and disconnect the wiring harness.

The cabin audio selector is designed to be mounted in any suitable orientation.

3.4 Configuration

The CA-003 must be configured and loaded specific to the aircraft installation. There are 2 levels of configurability for the unit.

The first level is called the Tuning Database. PA mapping and functionality are part of this database. These adjustments are determined by Alto Aviation and either pre-loaded into the unit or loaded on-site. The unit will be labeled with the Database information.

The second level is the Configuration Table. These are parameters that can be set by a technician to specify customer preferences and default operating conditions. These come with default values from the factory as part of the loaded database. Table A1 outlines these parameters.

3.5 Connections

3.5.1 Line Level Outputs

There are 6 channels of output capable of driving 50mW into a 32 ohm load. These channels are optimized for driving typical headphones or high impedance inputs. A total of 3 stereo output channels may be controlled individually.

3.5.2 Discrete Key Line Inputs

The CA-003 uses these inputs to trigger audio source change, volume adjustment, mute, and for other functionality.

The Discrete Line Key inputs accept logic level pulled to Ground. This line is coupled to an opto-isolator. To activate, the line should be pulled to a ground level sufficient to allow 20mA of current to flow.

Audio input lines should be grounded at the source.

3.5.3 PA / Mic Input

The PA / Mic input may be a low level audio signal or a dynamic microphone input. A PA signal from an existing PA controller may be connected along with the PTT trigger. If direct connection to a microphone requiring voltage bias is desired, then the configuration database will need to be set up to provide this. Please contact Alto Aviation to define your PA requirements so the proper database may be loaded into the cabin audio selector prior to delivery.

3.5.4 Control Keypads

Up to 3 control panels may be supported.

Three methods for source selection can be used. Source selection can be done via an internal short of both up and down pins in the keypad. It can also be done via a dedicated discrete line, where a momentary press triggers a source down function. Additionally, a MSB/LSB source switching logic can be used.

For complete information on the control panels, please refer to the corresponding product manual.

3.5.5 Electrical Load Analysis

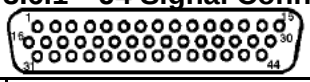
Prior to installation, perform an electrical load analysis on the aircraft. Use the following values to support the analysis:

- **28 VDC Nominal Load:** 1 Amp
- **28 VDC Maximum Load:** 2 Amp

Ensure that the power input to the unit is circuit-protected.

3.6 Connector Pinouts

3.6.1 J4 Signal Connector

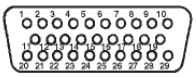


44 pin Male Hi-Density D-Sub Positronic ODD44M5B100V5X
Mate= DD44S10JVLX

PIN	DESCRIPTION	Details
30	Audio1 Left Input +	Shielded Twisted Pair (30&15). Connect Shield at source.
15	Audio1 Left Input -	Shielded Twisted Pair (30&15). Connect Shield at source.
18	Audio1 Right Input +	Shielded Twisted Pair (18&16). Connect Shield at source.
16	Audio1 Right Input -	Shielded Twisted Pair (18&16). Connect Shield at source.
28	Audio2 Left Input +	Shielded Twisted Pair (28&29). Connect Shield at source.
29	Audio2 Left Input -	Shielded Twisted Pair (28&29). Connect Shield at source.
26	Audio2 Right Input +	Shielded Twisted Pair (26&27). Connect Shield at source.
27	Audio2 Right Input -	Shielded Twisted Pair (26&27). Connect Shield at source.
6	Audio3 Left input +	Shielded Twisted Pair (6&7). Connect Shield at source.
7	Audio3 Left input -	Shielded Twisted Pair (6&7). Connect Shield at source.
5	Audio3 Right input +	Shielded Twisted Pair (5&4). Connect Shield at source.
4	Audio3 Right input -	Shielded Twisted Pair (5&4). Connect Shield at source.
10	Audio4 Left input +	Shielded Twisted Pair (10&11). Connect Shield at source.
11	Audio4 Left input -	Shielded Twisted Pair (10&11). Connect Shield at source.
9	Audio4 Right input +	Shielded Twisted Pair (9&8). Connect Shield at source.
8	Audio4 Right input -	Shielded Twisted Pair (9&8). Connect Shield at source.
2	Cabin 1 Left Output	Shielded Twisted Pair (2&22). Connect Shield at source.
3	Cabin 1 Right Output	Shielded Twisted Pair (3&22). Connect Shield at source.
22	Cabin 1 Audio Return	
1	Cabin 2 Left Output	Shielded Twisted Pair (1&24). Connect Shield at source.
20	Cabin 2 Right Output	Shielded Twisted Pair (20&24). Connect Shield at source.
24	Cabin 2 Audio Return	
13	Cabin 3 Left Output	Shielded Twisted Pair (13&12). Connect Shield at source.
14	Cabin 3 Right Output	Shielded Twisted Pair (14&12). Connect Shield at source.
12	Cabin 3 Audio Return	
33	Reserved	
35	Reserved	
31	Reserved	
37	Reserved	
39	Reserved	
42	Reserved	
17	Global Mute	
19	Cabin 1 Volume +	Twisted Pair (19&21)
21	Cabin 1 Volume -	Twisted Pair (19&21)
23	Cabin 1 Source Down	Twisted Pair (23&25)
25	Cabin 1 Mute On	Twisted Pair (23&25)
44	Cabin 2 Volume +	Twisted Pair (44&32)
32	Cabin 2 Volume -	Twisted Pair (44&32)
34	Cabin 2 Source Down	Twisted Pair (34&36)
36	Cabin 2 Mute On	Twisted Pair (34&36)
38	Cabin 3 Volume +	Twisted Pair (38&40)
40	Cabin 3 Volume -	Twisted Pair (38&40)
41	Cabin 3 Source Down	Twisted Pair (41&43)
43	Cabin 3 Mute On	Twisted Pair (41&43)

Figure 4: Signal Connector J4

3.6.2 J5 Power Connector



29 pin Male Std-Density D-Sub Positronic MD29M5B100V5X
Mate= RD29S10JVLX

PIN	DESCRIPTION	Details
1	Reserved	
2	Reserved	
3	+5V Power Output	
4	+5V Return	
5	Reserved	
6	Reserved	
7	Diagnostic Test Audio In R	Twisted Pair (7&8) with Shield (19) to B Connector
8	Diagnostic Test Audio In L	Twisted Pair (7&8) with Shield (19) to B Connector
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	
16	N/C	N/C
17	N/C	N/C
18	N/C	N/C
19	Audio Return, Shield	Shield to B Connector
20	+28V Power	
21	+28V Power	
22	PA Active\ logic output	
23	N/C	N/C
24	RS-422 RX-	Twisted Pair (24&25) to B Connector
25	RS-422 RX+	Twisted Pair (24&25) to B Connector
26	RS-422 TX-	Twisted Pair (26&27) to B Connector
27	RS-422 TX+	Twisted Pair (26&27) to B Connector
28	+28V Return	
29	+28V Return	

Figure 5: Power Connector J5

3.7 Wiring Requirements

The installing agency is responsible for the supply or fabrication of the wiring harnesses. Perform a pin-to-pin check to confirm that all wires terminate at their proper location. Pay close attention to the power and ground connections.

Do not connect any unnecessary wiring. Any wires installed for future use must be capped or terminated near the unit.

The length of the input wires should be kept at a minimum to reduce the chance of noise being introduced into the system.

Avoid parallel runs or installation of audio signal cables in close proximity of transmitter coax cables, high current DC power wiring, AC power wiring, or other high current wiring.

Avoid installation in close proximity to any device with a strong alternating magnetic field such as an inverter or electrical motor.

Wire size, type, and installation should comply with all industry regulations pertaining to the actual installation.

3.8 Power Supply

The power wiring to the unit must be protected by a circuit breaker or fuse located close to the source of the power.

Power supply wires must be of sufficient size such that the power supply voltage does not drop more than 2 volts between the power source and the unit.

The DC Return power wire should be attached to a local ground close to the unit.

Avoid installation in close proximity to any device with a strong alternating magnetic field such as an inverter or electrical motor.

The AC ripple on the power supply wires at the unit should be less than 2 Volts peak-to-peak to avoid noise being introduced into the system.

Wire size, type, and installation should comply with all industry regulations pertaining to the actual installation.

Both power and ground pins should be used on this unit. Parallel pins to a common power and ground feed.

3.9 Chassis and Signal Ground

The unit's chassis provides a ground lug that must be strapped to airframe or appropriate local ground point. The ground strap to chassis impedance should be less than .003 ohms (3 milliohms). The audio signal ground is referenced to the +28V Return J5 pins 28 & 29. In order to avoid ground loop noise any audio source equipment feeding audio to the cabin audio selector should be grounded as closely as possible to the cabin audio selector +28V Return reference point.

4.0 ALTONET DIAGNOSTIC CONNECTOR EXTENSION KIT

The 200901 Connector Kit will provide access to the J5 Alto Connector for customer tuning and system verification in Alto's 106570 Digital Amplifiers. The contents of this kit when combined with installer-supplied 26 AWG twisted pair cable creates an extension cable that allows remote access to the cabin audio selector's configuration and verification data port.

This break out extension should be terminated at a location that is easy to access for programming. This extension cable connects to a PC programming adapter provided by Alto.

4.1 Wiring Requirements

Diagnostic Port Connector B PN: Positronic # DD26S1F000 (Alto PN 200462)

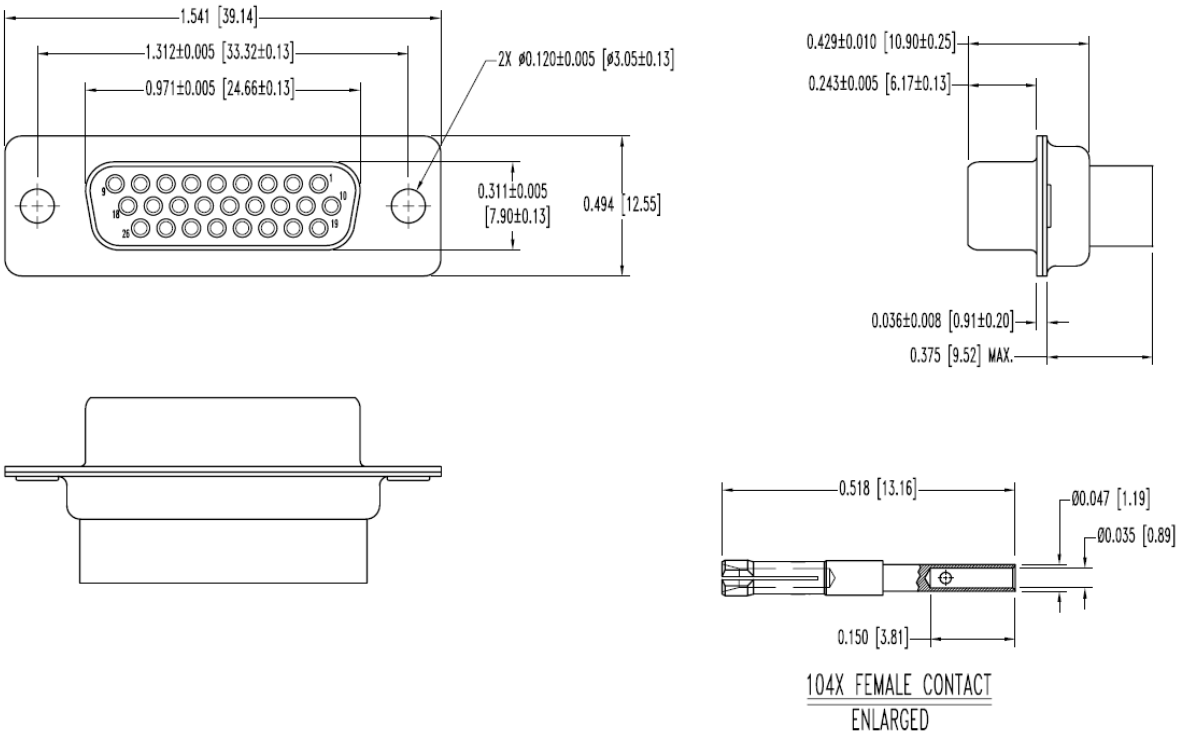


Figure 6: Diagnostic Port Connector B Dimensions

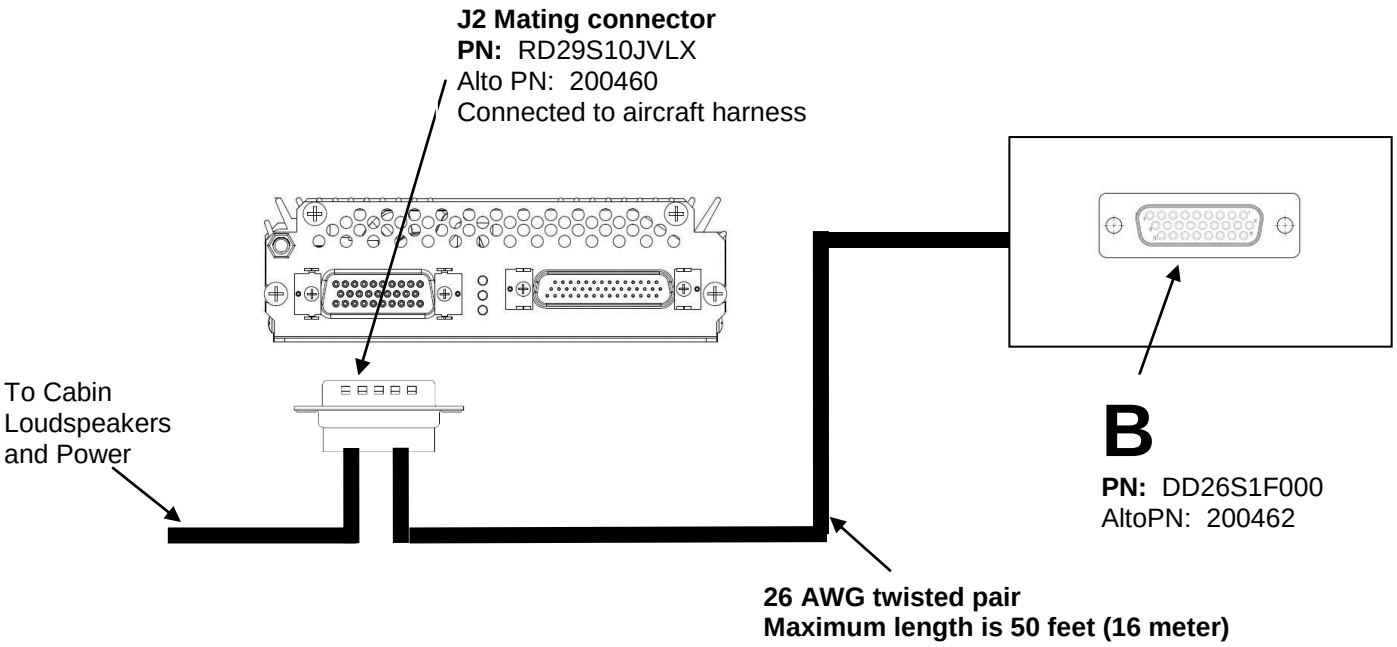


Figure 7: Connector Extension Kit

Connector **B** should be mounted in an easily accessible location, typically a closet or access panel. If the aircraft contains multiple amplifiers, then a separate connector is required for each amplifier.

Note: Maximum length of harness is 50 feet (16 meter).

4.2 Diagnostic Port Connector Wiring

J5 PINs	DESCRIPTION	Details – AWG 26	**B** PINs
3	+5V Power Output	Twisted Pair (3&4) to B Connector	13
4	+5V Return	Twisted Pair (3&4) to B Connector	17
7	Diagnostic Test Audio In R	Twisted Pair (7&8) w/Shield (19) to B Connector	5
8	Diagnostic Test Audio In L	Twisted Pair (7&8) w/Shield (19) to B Connector	10
19	Audio Return, Shield	Shield to B Connector	4
24	RS-422 RX-	Twisted Pair (24&25) to B Connector	6
25	RS-422 RX+	Twisted Pair (24&25) to B Connector	7
26	RS-422 TX-	Twisted Pair (26&27) to B Connector	8
27	RS-422 TX+	Twisted Pair (26&27) to B Connector	9
	(J5 pins may be shared with A/C connections)	(All other Pins on B connector are N/C)	

Figure 8: Diagnostic Port Connector Wiring Chart

5.0 CHECKOUT

The operation of the CA-003 is dependent on the source units that provide the audio inputs to the unit and the speakers attached to the output. Ensure that all units in the audio system are operating properly before beginning the checkout of this unit.

The unit is hard wired into the aircraft power system.

Insure that all connections are made and the Green POWER LED is illuminated.

6.0 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

6.1 Periodic Maintenance

No periodic scheduled maintenance or calibration is required for continued airworthiness of the CA-003. If the unit fails to perform to specifications, it must be removed and serviced by a qualified service facility.

7.0 GENERAL TROUBLE SHOOTING PROCEDURES

- Verify power to the unit by rechecking 28VDC power is applied to the proper pins on the unit. Use a voltmeter to verify correct level.
- Remove power from the unit for at least ten (10) seconds and re-apply power.
- Recheck all connections to the unit for security. Check all harness runs for possible pinching. Recheck all pin-outs for application accuracy.

7.1 System Fault Codes

Refer to Figure 2 for end plate LED indicators. The PA cabin audio selector has a red LED used to report fault conditions. Fault codes are reported by a sequence of 0.5 second blinks followed by a 1.5 second pause. Any logged faults will be blinked in sequence and then the sequence will repeat. If a fault is cleared then the blink code will be removed from the sequence.

# of blinks	Description	Resolution
Steady Glow	Unit is initializing or Unit is in standby.	Insure the voltage level at the input power pins is above the minimum operating voltage.
2	Database Fault, Unit has detected a corrupted or incorrectly loaded Tuning Database	Re-load the Tuning Database through the CMS or using the Alto Forte manager Software.
4	Cabin audio selector General Fault. Unit has detected a general internal subsystem fault	Insure all connectors properly seated. Cycle unit power. Insure power supply voltage is sufficient.
5	DSP / CODEC Fault. Unit has detected a problem with the internal DSP subsystem	Insure temperature and voltage conditions are within spec. Cycle unit power.
7	Temperature or Voltage Fault. Unit has entered an under-voltage or Over-temperature condition	Check power supply voltage to insure it is within spec. Inspect unit for hot condition, allow to cool.

Figure 9 System Fault Codes

7.2 Basic Troubleshooting

Problem	Possible Cause	Possible Solution
Audio distortion, level problems, imbalance in PA section	Configuration settings not set appropriately for installation	Reset settings to defaults, insure each is properly set and tested (Appendix 1)
Noise or Interference in PA announcement	Possible noise induced in wiring from Microphone or Briefer inputs	Insure wiring is properly shielded and connected. Insure source equipment (microphone buffers etc.) are set properly

Figure 10: Basic Troubleshooting

8.0 TECHNICAL SPECIFICATIONS

8.1 Cabin Audio Selector

Power Requirements

Supply Voltage	nominal:	DC, 28V
	Maximum:	32V
	Minimum:	22V
Supply Current	maximum:	1A
	Nominal:	500mA (varies with audio content)
	Idle:	500mA
Circuit Breaker (recommended):		2 Amp

Input Specifications

Input Characteristic	8 X Analog inputs, diff 44kohm input. Mic1 configurable as Ground biased
	All inputs accept line signal between 600mV and 4V RMS nominal

Output Specifications

Line Output Power	3 stereo total	300 milliwatts RMS
	per channel	50 milliwatts RMS
Line Load Recommended	>32 ohm	
Maximum Measured Delay	1.25 milliseconds	
Output Protection	Differential short, short to ground, overload, and thermal	
Distortion	@50% rated power	< 0.1% THD
	@ rated power	< 0.5% THD
Output Noise	no input signal	< 50 uV A-Weighted
Frequency Response		20 - 20,000 Hz

8.2 Other Specifications

Signal Connector J4

44 pin Male Hi-Density D-Sub	Positronic #	ODD44M5B100V5X
Mating connector	Positronic #	DD44S10JVLX

Power Connector J5

29 pin Male Std-Density D-Sub	Positronic #	MD29M5B100V5X
Mating connector	Positronic #	RD29S10JVLX

Physical Specifications

Weight	< 2.0 lbs / .91 kg
Dimensions	5.3”W x 1.7”H x 9.9”D (135mmW x 42mmH x 249mmD)

TSO-C139a Certified

DO-160G Env. Cat.

[A2X]CAB[(SC)(HR)]EXXXXXZ[Z(XX)]AZ[AC][TT]M[XXE3XX][XXXX]XAX

9.0 OPERATION

The operation of the CA-003 is dependent on the source units that provide the audio inputs to the unit and the speakers attached to the output.

Once the unit is installed and any configuration table adjustments are made, the unit requires no further direct user interaction.

9.1 Controls

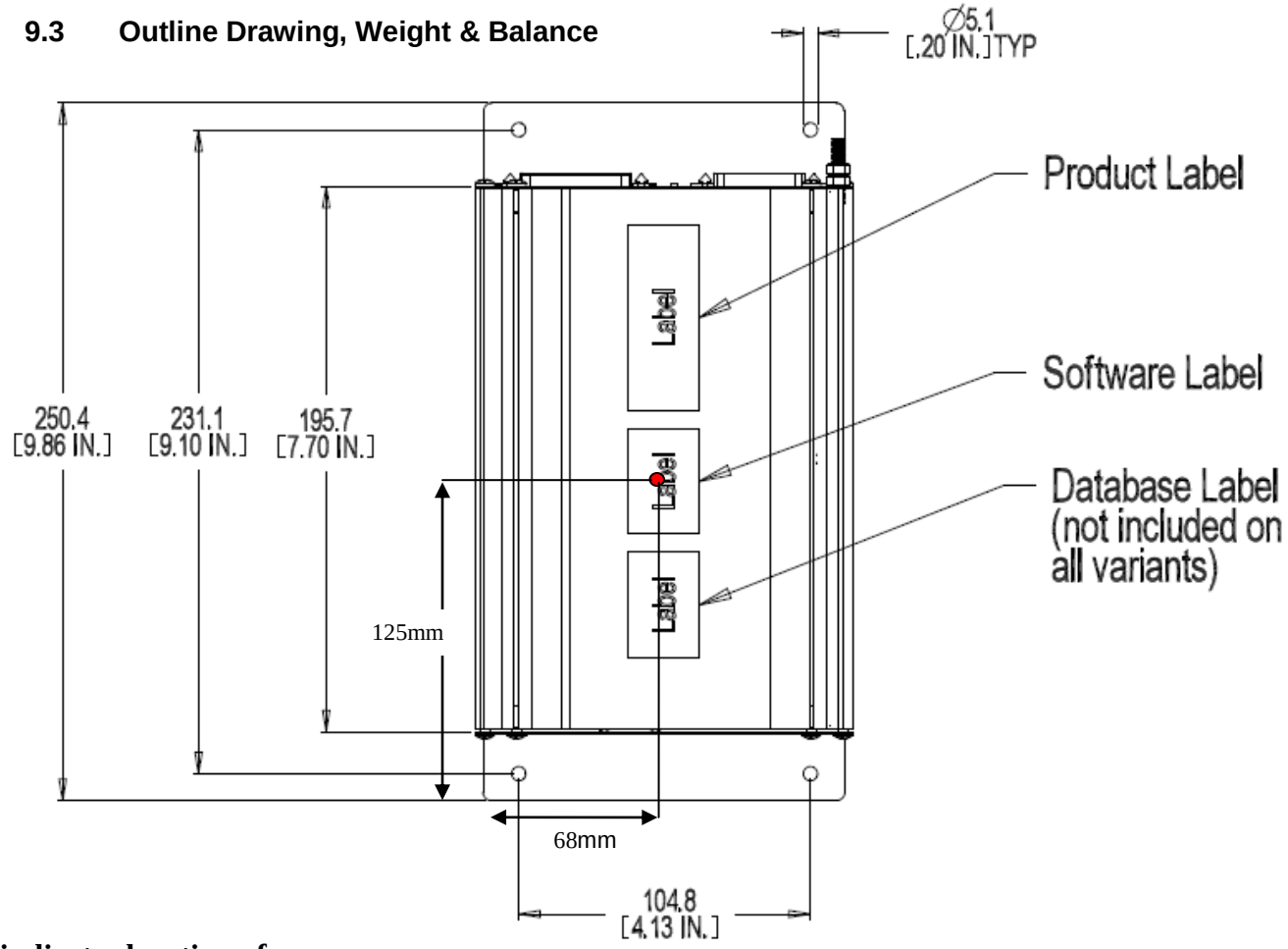
There are no user controls on the unit. All operation is controlled through the wired inputs.

9.2 Operation

9.2.1 Power On/Off

The unit is hard wired into the aircraft power system and has no independent On/Off switch on the unit. The unit is operating whenever the power is applied to the unit.

9.3 Outline Drawing, Weight & Balance

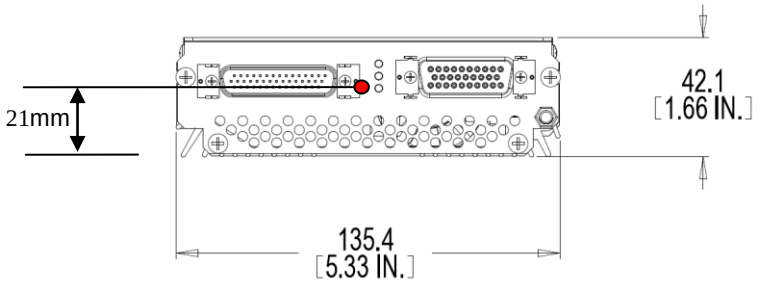


Dot indicates location of Center of Gravity.

Tolerance +-10mm

Unit weight: < 2.0 lbs / .91 kg

A Weight and Balance calculation aircraft is required as part of installation approval process.



Note: Dimensions are for reference only. See DA (Delivered Assembly) drawing for exact dimensions.

Figure 11: CA-003 Outline Drawing, Weight & Balance

10.0 APPENDIX 1

10.1 Configuration Settings

The cabin audio selector contains a Configuration Table. These are parameters that affect default operating conditions. Only the Value entries can be changed.

Index	Parameter	Value	Low-Lim	Up-Lim	Default	DataType	Description	Settings
0	Mic1_Bias_GND	1	0	1	0	ON/OFF	Set switches to select input configuration	0 = Differential Input 1 = Mic Biased & Grounded
1	Mic1_Sidetone_Volume	0	-20	20	0	VOLUME	Adjusts volume of mixed sidetone signal from all Mics	0 = Off, otherwise gain setting from volume trim table
2	Mic1_Sidetone_KLI_En	0	0	1	1	ON/OFF	Enables whether Briefer is always present on sidetone	1 = Breifer mix only during KLI, 0 = Breifer always sent
3	Mic1_Feedback_Volume	0	-30	10	0	VOLUME	Adjusts volume of MicX feedback to it's own sidetone output	0 = default, plus or minus in 1dB steps
4	Mic1_Input_Atten	0	0	1	0	ON/OFF	Sets input attenuation -10dB switch	0 = no attenuation, 1 = -10dB
5	Mic1_Input_Volume	0	-30	23	0	VOLUME	Adjusts input volume for channel	0 = default, plus or minus in 1dB steps
6	Mic1_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
7	Mic1_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
8	Mic1_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Mic1 KLI is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
9	Mic1_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Mic1 KLI is released	Integer from 1 - 6 chooses tone from tone library 0=none
10	Mic2_Bias_GND	1	0	1	0	ON/OFF	Set switches to select input configuration	0 = Differential Input 1 = Mic Biased & Grounded
11	Mic2_Sidetone_Volume	0	-20	20	0	VOLUME	Adjusts volume of mixed sidetone signal	0 = Off, otherwise gain setting from volume trim table
12	Mic2_Sidetone_KLI_En	0	0	1	1	ON/OFF	Enables whether Briefer is always present on sidetone	1 = Breifer mix only during KLI, 0 = Breifer always sent
13	Mic2_Feedback_Volume	0	-30	10	0	VOLUME	Adjusts volume of MicX feedback to it's own sidetone output	0 = default, plus or minus in 1dB steps
14	Mic2_Input_Atten	0	0	1	0	ON/OFF	Sets input attenuation -10dB switch	0 = no attenuation, 1 = -10dB
15	Mic2_Input_Volume	0	-30	23	0	VOLUME	Adjusts input volume for channel	0 = default, plus or minus in 1dB steps
16	Mic2_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
17	Mic2_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
18	Mic2_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Mic2 KLI is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
19	Mic2_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Mic2	Integer from 1 - 6 chooses tone from tone

							KLI is released	library 0=none
20	Mic3_Bias_GND	1	0	1	0	ON/OFF	Set switches to select input configuration	0 = Differential Input 1 = Mic Biased & Grounded
21	Mic3_Sidetone_Volume	0	-20	20	0	VOLUME	Adjusts volume of mixed sidetone signal	0 = Off, otherwise gain setting from volume trim table
22	Mic3_Sidetone_KLI_En	0	0	1	1	ON/OFF	Enables whether Briefer is always present on sidetone	1 = Breifer mix only during KLI, 0 = Breifer always sent
23	Mic3_Feedback_Volume	0	-30	10	0	VOLUME	Adjusts volume of MicX feedback to it's own sidetone output	0 = default, plus or minus in 1dB steps
24	Mic3_Input_Atten	0	0	1	0	ON/OFF	Sets input attenuation -10dB switch	0 = no attenuation, 1 = -10dB
25	Mic3_Input_Volume	0	-30	23	0	VOLUME	Adjusts input volume for channel	0 = default, plus or minus in 1dB steps
26	Mic3_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
27	Line3_Input_Atten	0	0	1	0	ON/OFF	Sets input attenuation -10dB switch	0 = no attenuation, 1 = -10dB
28	Line4_Input_Atten	0	0	1	0	ON/OFF	Sets input attenuation -10dB switch	0 = no attenuation, 1 = -10dB
29	Ord1_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance2 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
30	Ord1_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance1 is released	Integer from 1 - 6 chooses tone from tone library 0=none
31	Ord1_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
32	Ord1_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
33	Ord1_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
34	Ord2_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance2 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
35	Ord2_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance2 is released	Integer from 1 - 6 chooses tone from tone library 0=none
36	Ord2_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
37	Ord2_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
38	Ord2_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
39	Ord3_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance3 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
40	Ord3_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance3 is released	Integer from 1 - 6 chooses tone from tone library 0=none
41	Ord3_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2

42	Ord3_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
43	Ord3_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
44	Ord4_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance4 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
45	Ord4_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance4 is released	Integer from 1 - 6 chooses tone from tone library 0=none
46	Ord4_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
47	Ord4_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
48	Ord4_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
49	Ord5_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance5 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
50	Ord5_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance5 is released	Integer from 1 - 6 chooses tone from tone library 0=none
51	Ord5_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
52	Ord5_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
53	Ord5_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
54	Ord6_ON_Chime_Sel	3	0	6	3	CHIME	Specifies chime sound to play when Ordinance6 is enabled	Integer from 1 - 6 chooses tone from tone library 0=none
55	Ord6_OFF_Chime_Sel	2	0	6	2	CHIME	Specifies chime sound to play when Ordinance6 is released	Integer from 1 - 6 chooses tone from tone library 0=none
56	Ord6_Output_Mask	0	0	255	0	MUTE_MASK	Specifies which output channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-3 set indicate mute of channels 1-4 respectively. Bits 4-5 = line out L&R, bits 6-7 chime out 1&2
57	Ord6_Sidetone_Mask	0	0	127	0	MUTE_MASK	Specifies which sidetone channels are enabled for this event. 1=mute channel, 0=enable channel	bits 0-2 set indicate mute of sidetone 1-3 respectively. Bit3 is relay inhibit, Bit4 is PA_Event Inhibit, Bit5 is PA_Message Inhibit, Bit6 is PA_Active Inhibit
58	Ord6_Mutes_Speaker	0	0	15	0	MUTE_MASK	Specifies if the ordinance line is used to issue an ordinance or acts to mute a PA speaker group for use in FAR135 cabin	0 = Normal ordinance function, bits 1-4 set indicate mute of channels 1-4 respectively.
59	PAMaster_Spkr_Volume	0	-30	10	0	VOLUME	Master Volume for PA amp (speakers only)	0 = default, plus or minus in 1dB steps
60	Headphone_PA_Volume	0	-30	10	0	VOLUME	Master Volume for PA (Headphones only)	0 = default, plus or minus in 1dB steps
61	Wght_On_Wheel_Atten	2	0	10	2	VOLUME	Specifies how much to attenuate master volume when WOW	0 = none, positive amount 1dB steps = attenuation

62	PA_Audio_Delay	0	0	255	0	DELAY	Specifies the delay after PA event before audio enabling	Time in tens of mSec (100 = 1sec etc)
63	Chime_Master_Volume	0	-40	0	0	VOLUME	Master Volume for the Chime signals	0 = default, plus or minus in 1dB steps
64	FAR135_Mic1_Override	0	0	1	0	ON/OFF	Specifies whether Mic1 announcements should override any Speaker Mutes	0 = doesn't override, 1 = overrides
65	Headphn_Dflt_Volume	10	0	31	15	VOLUME	Default Volume for Headphones	0 = default, plus or minus in 1dB steps
66	Cabin_Dflt_Volume	10	0	31	15	VOLUME	Default Volume for Cabin	0 = default, plus or minus in 1dB steps
67	Cabin_Dflt_Bass	10	0	31	15	VOLUME	Default Bass for Cabin	0 = default, plus or minus in 1dB steps
68	Cabin_Dflt_Treble	10	0	31	15	VOLUME	Default Treble for Cabin	0 = default, plus or minus in 1dB steps
69	Cabin_Dflt_Loudness	10	0	31	15	VOLUME	Default Loudness for Cabin	0 = default, plus or minus in 1dB steps
70	Cabin_Dflt_Mute	0	0	1	0	MUTE_MASK	Default Mute for Cabin	0 = Unmuted, 1 = Muted
71	Input_Select_Mask	15	0	15	15	MUTE_MASK	Input Enable mask for 4 input pairs	Bits 0 = Ch1, 1 = Ch2, 2 = Ch3, 3 = Ch4
72	Input1_Gain_Trim	0	-40	15	0	VOLUME	Input Gain for Channel 1	0 = default, plus or minus in 1dB steps
73	Input2_Gain_Trim	0	-40	15	0	VOLUME	Input Gain for Channel 2	0 = default, plus or minus in 1dB steps
74	Input3_Gain_Trim	0	-40	15	0	VOLUME	Input Gain for Channel 3	0 = default, plus or minus in 1dB steps
75	Input4_Gain_Trim	0	-40	15	0	VOLUME	Input Gain for Channel 4	0 = default, plus or minus in 1dB steps
76	Speaker1_Gain_Trim	0	-45	15	0	VOLUME	Output gain for channels 1	0 = default, plus or minus in 1dB steps
77	Speaker2_Gain_Trim	0	-45	15	0	VOLUME	Output gain for channels 2	0 = default, plus or minus in 1dB steps
78	Speaker3_Gain_Trim	0	-45	15	0	VOLUME	Output gain for channel 3	0 = default, plus or minus in 1dB steps
79	Speaker4_Gain_Trim	0	-45	15	0	VOLUME	Output gain for channel 4	0 = default, plus or minus in 1dB steps
80	Speaker1_Expctd_Load	2	0	255	2	OHM	Output load for channels 1	0=open, 4=4ohm, etc. 255 = open
81	Speaker2_Expctd_Load	2	0	255	2	OHM	Output load for channels 2	0=open, 4=4ohm, etc. 255 = open
82	Speaker3_Expctd_Load	2	0	255	2	OHM	Output load for channel 3	0=open, 4=4ohm, etc. 255 = open
83	Speaker4_Expctd_Load	2	0	255	2	OHM	Output load for channel 4	0=open, 4=4ohm, etc. 255 = open
84	Discrete_Line1	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
85	Discrete_Line2	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
86	Discrete_Line3	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
87	Discrete_Line4	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
88	Discrete_Line5	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
89	Discrete_Line6	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
90	Discrete_Line7	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
91	Discrete_Line8	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
92	Discrete_Line9	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
93	Discrete_Line10	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
94	Discrete_Line11	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
95	Discrete_Line12	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions
96	Discrete_Line13	0	0	39	0	DISCRETE	Setting for Discrete Input Pin	0-39 codes for various functions

Table A1

10.2 Environmental Categories and Tests

Environmental Tests	*RTCA/DO-160G Section*	*Conducted Test Category*
Temperature and Altitude		
Low Temp	4.5.1 & 4.5.2	Qualified by Similarity to Category **A2**
High Temp	4.5.3 & 4.5.4	Qualified by Similarity to Category **A2**
In-Flight Loss of Cooling	4.5.5	Identified as Category **X** Not applicable, cooling not required
Altitude	4.6.1	Qualified by Similarity to Category **A2**
Decompression	4.6.2	Qualified by Similarity to Category **A2**
Overpressure	4.6.3	Identified as Category **X** , no test performed
Temperature Variation	5	Qualified by Similarity to Category **C**
Humidity	6	Qualified by Similarity to Category **A**
Operational Shocks & Crash Safety	7	Qualified by Similarity to Category **B**
Vibration	8	Qualified by Similarity to Category **S, H**, Curve(s) **C, R**
Explosion Proofness	9	Qualified by Similarity to Category **E**
Waterproofness	10	Identified as Category **X** , no test performed
Fluids Susceptibility	11	Identified as Category **X** , no test performed
Sand and Dust	12	Identified as Category **X** , no test performed
Fungus Resistance	13	Identified as Category **X,** no test performed
Salt Spray	14	Identified as Category **X** , no test performed
Magnetic Effects	15	Qualified by Similarity to Category **Z**
Power Input	16	Qualified by Similarity to Category **ZXX**
Voltage Spike	17	Qualified by Similarity to Category **A**
Audio Frequency Conducted Susceptibility	18	Qualified by Similarity to Category **Z**
Induced Signal Susceptibility	19	Qualified by Similarity to Category **AC**
Radio Frequency Susceptibility	20	Qualified by Similarity to Conducted **T** Radiated **T**
Emission of Radio Frequency Energy	21	Qualified by Similarity to Category **M**
Lightning Induced Transient Susceptibility	22	Qualified by Similarity to Category **XXE3XX** Pin Injection **XX** Cable Bundle **E3** , no test performed Burst **XX** , no test performed
Lightning Direct Effects	23	Identified as Category **XXXX** , no test performed
Icing	24	Identified as Category **X** , no test performed
Electrostatic Discharge	25	Qualified by Similarity to Category **A**
Fire, Flammability	26	Identified as Category **X,** no test performed

Table A2