ASM-LSC22

LSC22
Loudspeaker Controller

INSTALLATION AND OPERATION MANUAL

REV 1.20 September 13, 2021

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The status of this installation and operation manual is controlled by the revision shown on the title page. The status of each section is controlled by revision shown in the footer of each page. All revisions affecting sections of this manual have been incorporated.

AEM MANUAL REVISIONS

Section	Revision Number	Revision Description	Date
All	Rev: 1.20	RAS997: Modify equipment list on interconnect drawing for obsolescence.	Sept 13, 2021
All	Rev: 1.10	ECO1067: Update Message 3 Playback	Nov 24, 2017
All	Rev: 1.00	Initial release	Jan 24, 2017

Table of Contents

Section 1.0 Description

1.1 Introduction

Information in this section consists of product description, design features and specifications for the LSC22 Loudspeaker Controller. All derivative product information will be contained in the applicable manual supplement, which may be obtained from AEM as required.

Review all notes, warnings and cautions.

1.2 Product Description

The LSC22 Loudspeaker Controller is designed to provide centralized control for an aircraft's internal and external loudspeaker systems.

The design is contained in one panel mounted unit, with an illuminated faceplate.

All audio and key lines are interfaced to existing aircraft audio systems.

Front panel switches provide selection of the various operational modes of the LSC22 and a potentiometer provides output volume control.

Onboard flash memory provides a means to record messages for playback at a later time. A front panel connector provides programming/recording access.

1.3 Design Features

The LSC22 provides selection and control of internal or external PA system(s) installed in an aircraft. An integrated 25W speaker driver circuit is designed to drive one 8 Ohm speaker arrangement for internal paging. The LSC22 also provides one low level audio signal external output that can drive the input on a remote mounted power amplifier.

The LSC22 generates wail and yelp siren audio for use with a remote power amplifier and speaker system.

A '-3dB' function allows the output level of the system to be reduced by 3 dB when the input control line is grounded. Removing the ground returns the system to full output. This function is used to create an "auto level control' that automatically increases the system output volume following engine start.

The amplifier is thermal and short circuit protected to prevent damage. The built in power supply is overcurrent and reverse polarity protected.

Front panel switches provide selection of the various operational modes of the LSC22 including a VOL/PWR which provides volume control of the selected output and a means of turning off the system.

One front panel Auxiliary input jack provides both an input audio from an external device and a maintenance mode USB connection that enables loading of audio wave files.

1.4 Specifications

1.4.1 Electrical Specifications

1.4.1.1 Input Operating Voltage

Normal Operating Conditions:

Nominal:	+28.0 Vdc
Maximum:	+30.3 Vdc
Minimum:	+22.0 Vdc
Emergency:	+18.0 Vdc

Abnormal Operating Conditions:

Maximum:	+32.2 Vdc
Minimum:	+20.5 Vdc

1.4.1.2 Input Operating Current

Input Current:

2.0 A max @ 28.0 Vdc
0.2 A idle max @ 28.0 Vdc

Backlighting Current:

28V Lights Power:	10 mA max @ +28.0 Vdc
5V Lights Power:	10 mA max @ +5.0 Vdc

1.4.1.3 Input Signals

Microphone Audio	(MIC HI)
Quantity:	1
Microphone Type:	Amplified dynamic/electret
Circuit Type:	Single-Ended
Rated Level:	250 mVrms (TBD) ± 10%
Impedance:	150 Ohm ± 10%
Mic Bias:	+12Vdc min
Compression:	85 mVrms rotation point, 1.5:1 compression ratio
Radio Audio Input	(RADIO HI)
Quantity:	1
Circuit Type:	Single-Ended
Rated Level:	2.5 Vrms ± 10%
Impedance:	1 kOhm ± 10%
Auxiliary Audio Input	Interface Connector (AUX LEFT/AUX RIGHT)
Quantity:	1
Circuit Type:	Single-Ended, Stereo
Rated Level:	500 mVrms ± 10%
Impedance:	1 kOhm ± 10%
Compression:	200 mVrms rotation point, 1.5:1 comp ratio
Auxiliary Audio Input	Front Panel Jack (AUX LEFT/AUX RIGHT)
Quantity:	1
Circuit Type:	Single-Ended, Stereo
Rated Level:	500 mVrms ± 10%
Impedance:	1 kOhm ± 10%
Compression:	200 mVrms rotation point, 1.5:1 comp ratio
Mic Key Input	(MIC KEY)
Quantity:	1
Rated Level:	Gnd (active low), 1 Vdc maximum
Current In:	≤ 10 mA
-3 dB Control Input	(-3DB SELECT)
Quantity:	1
Rated Level:	Gnd (active low), 1 Vdc maximum
Current In:	≤ 10 mA
Siren Key Input	(SIREN KEY)
Quantity:	1
Rated Level:	Gnd (active low), 1 Vdc maximum
Current In:	≤ 10 mA
Play Once Input	(PLAY ONCE)
Quantity:	1
Rated Level:	Gnd (active low), 1 Vdc maximum
Current In:	≤ 10 mA

1.4.1.3 Output Signals

Internal PA Audio	(INT PA HI/LO)
Quantity:	1
Circuit Type:	Differential
Rated Level:	25W (14.15 ± 10% Vrms)
Rated Load Impedance:	8 Ohms ± 10%
Output Impedance:	≤ 3 Ohms
Frequency Response:	≤ 3 dB from 200 Hz to 6 kHz
Distortion:	≤ 10% @ rated output
Audio Noise Level:	≥-60 dB from rated output
Sidetone Audio	(SIDETONE HI/LO)
Quantity:	1
Circuit Type:	Balanced
Rated Level:	7.75 Vrms ± 10%
Rated Load Impedance:	600 Ohms ± 10%
Output Impedance:	≤ 75 Ohms
Frequency Response:	≤ 3 dB from 200 Hz to 6 kHz
Distortion:	≤ 10% @ Rated output
Audio Noise Level:	≥-60 dB from rated output
External PA Audio	(EXT PA HI/LO)
Quantity:	1
Circuit Type:	Balanced
Rated Level:	Selectable 500 mVrms ± 10% (LSA400/800, PA250/700) or 6.5 Vrms ± 10% (PA110/PA220)
Rated Load Impedance:	600 Ohms ± 10%
Output Impedance:	≤ 75 Ohms
Frequency Response:	≤ 3 dB from 200 Hz to 6 kHz
Distortion:	≤ 10% @ Rated output
Audio Noise Level:	≥-60 dB from rated output
Switched Power Output	(SWITCHED POWER)
Quantity:	1
Rated Level:	26.5 Vdc (active high)
Current Output:	0.4 A maximum, over-current protected

1.4.2 Physical Specifications

Height	1.11” [28.2mm]
Depth (behind panel)	6.34” [161.0mm]
Depth (behind panel including connectors)	6.59” [167.4mm]
Width (behind panel)	4.84” [122.9mm]
Width (front panel)	5.74” [145.8mm]
Weight	1.2 lbs (0.54 kg)
Mounting	Dzus rail (4 fasteners), 0.375” vertical spacing with Allen key head (0.094” across the flats). Dzus stud head has custom diameter of 0.300”.
Connectors	One 25 pin male D-subminiature with V5 locks One 9 pin male D-subminiature with V5 locks One 3.5mm, 4 conductor jack
Material/Finish	Enclosure shall be conversion coated aluminum. Finish is clear conversion coating per MIL-DTL Type II Class 3
Bonding	≤2.5 mΩ

1.4.3 Environmental Specifications

Temperature	-40 to +70°C (operating) -55 to +85°C (survival)
Altitude	35,000 feet max.
Humidity	95% Non-condensing
Operational Shock Crash Safety Shock	6g for 11msec (any axis) 20g for 11 msec (impulse), 3 sec (sustained)
Vibration	DO-160G category ‘S’ curves B & M DO-160G category ‘U2’ curves F & F1

Qualification of the LSC22 Loudspeaker Controller was completed in accordance with DO-160G Env. Cat. C4-BAB[SBM][U2FF1]XXXXXXZ[BXX]AB[ACE]XMXXXAX.

Note: Refer to Environmental Qualification Form located in Section 2 of this Manual for complete details of the environmental categories.

1.4.4 Product Approval/Certification

None

1.5 Unit Nomenclature

LSC22-001	Dzus mount Loudspeaker Controller Blue/White Panel Lighting
LSC22-001N	Dzus mount Loudspeaker Controller NVIS Green A Panel Lighting

See appropriate Installation and Operation Manual Supplements for other model numbers.

End of Section 1.0

Section 2.0 Installation

2.1 Introduction

Information in this section consists of: unpacking and inspection procedures, installation procedures, post-installation checks, and installation drawings.

2.2 Unpacking and Inspection

Unpack the equipment carefully. Inspect the unit visually for damage due to shipping and report all such claims immediately to the carrier involved. Note that each unit should have the following:

- LSC22
- USB Type A to 3.5mm 4 conductor cable
- Certificate of Conformity or Release certification

Verify that all items are present before proceeding and report any shortage immediately to your supplier.

2.2.1 Warranty

All Anodyne Electronics Manufacturing Corp. (AEM) products are warranted for 2 years. See the website www.aem-corp.com/warranty for complete details.

2.3 Installation Procedures

2.3.1 Warnings

WARNING:
High volume settings can cause hearing damage. Set the volume control to the minimum volume setting prior to conducting tests, and slowly increase the volume to a comfortable listening level.

WARNING:
When the LSC22 is connected in a speaker amplifier system, the system is capable of producing high sound pressure levels. Proper personal protective equipment is required to prevent hearing damage.

2.3.2 Cautions

CAUTION:
Do not remove components or external connections (with the exception of the AUX input) from the product while the unit is turned on. This could cause damage to the component or unit.

2.3.3 Cabling and Wiring

All wire shall be selected in accordance with the original aircraft manufacturer's Maintenance Instructions or AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Unshielded wire types shall qualify to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with solder sleeves (for shield terminations) to make the most compact and easily terminated interconnect. Follow the interconnect drawing in Section 2.7 as required.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Refer to the interconnect drawing in Section 2.7 for shield termination details. Aircraft harnessing shall permit the unit to be removed for easy access to all adjustments.

Maintain wire segregation and route wiring in accordance with the original aircraft manufacturers Maintenance Instructions.

Unless otherwise noted, all wiring shall be a minimum of 22 AWG, except power, ground, and internal pa speaker lines, which shall be a minimum of 20 AWG. Reference the Interconnect drawing for additional specifications. Check that the ground connection is clean and well secured, and that it shares no path with any electrically noisy aircraft accessories such as blowers, turn and bank instruments or similar loads. Power to this unit must be supplied from a separate circuit breaker or fuse (fast blow), and not attached to any other circuit breaker without additional protection. Verify that the selected circuit breaker size and wire gauge are adequate for the installation using the techniques specified in AC43.13-1B Change 1, Paragraphs 11-47 through 11-51 and 11-66 through 11-69.

2.3.4 Post-Installation Checks

Ensure all connectors are tight and the mechanical installation is sound.

2.3.4.1 Voltage/Resistance Checks

Do not connect the LSC22 to the wiring harness until the following conditions are met.

Check the following, refer to Section 2.7 for complete wiring details:

a) Check P101 pins 1, 2 for +28 Vdc relative to ground.
b) Check P101 pin 4 for continuity to chassis ground (less than 0.5Ω).
b) Check P101 pins 14, 15, 16 and P102 pin 6 for continuity to ground (less than 0.5Ω).
c) Check P101 pin 3 for 28V lighting voltage relative to ground or P102 pin 1 for 5V lighting voltage relative to ground.

2.3.4.2 Power On Checks

Power up the aircraft’s systems and confirm normal operation of all functions of the LSC22. Refer to Section 3 (Operation) for specific operational details.

Upon satisfactory completion of all performance checks, make all required log book entries, electrical load, weight and balance amendments and other documentation as required by your local regulatory agency before releasing the aircraft for service.

2.4 Adjustments and Connections

The unit is shipped from the factory with all internal adjustments set to the rated input test levels to achieve the rated output levels. Once installed in the aircraft, it may be desirable to change some of these settings to best suit the local operating environment. The internal adjustments are located on the left side of the unit when viewed from the faceplate:

User adjustable potentiometer adjustements (clockwise = increasing):

Adjustment	Description
MIC	Microphone Audio Input
RAD	Radio Audio Input
ST	Sidetone Audio Output
AUX	Auxiliary Audio Input
INT	Internal PA Audio Output
EXT	External PA Audio Output
MSG	Message Audio
SRN	Siren Audio

User selectable options for the EXT, MSG, MIC switches are as a follows:

Switch	Description	Up Position	Down Position
EXT	External PA Level Output	6.5 Vrms	0.5 Vrms*
MSG	Messages Played on INT PA	Yes	No*
MIC	Microphone Key Input Type	Live	Keyed*

* - Default Position

2.5 Accessories Required But Not Supplied

Installation kit p/n LSC22-IKC (crimp) is required to complete the installation. The kits consists of the following:

LSC22-IKC consists of

Quantity	Description	Part No.
1	D-min 25 Socket Housing	20-21-025
1	D-min 9 Socket Housing	20-21-009
34	MS Crimp Socket	20-26-901
1	25 Pin JVL Hood/Locklever	20-29-250
1	9 Pin JVL Hood/Locklever	20-29-090

2.6 Continued Airworthiness

Maintenance of the LSC22 Loud Speaker Controller is 'on condition' only. Periodic maintenance of this product is not required.

2.7 Installation Drawings

Use of the "#" symbol in the REV. column indicates that the document is listed elsewhere in the manual. Refer to the applicable AEM Part No. to locate the referenced document.

DOCUMENT	REV	DESCRIPTION	TYPE	SERIAL NO.
LSC22-001-403-0	1.20	Loudspeaker Controller	Interconnect	94590+
LSC22-001-403-0	1.10	Loudspeaker Controller	Interconnect	70480-94590
LSC22-001-403-0	1.00	Loudspeaker Controller	Interconnect	66517-70479
LSC22-001-405-0	1.10	Loudspeaker Controller	Connector Map	70480+
LSC22-001-405-0	1.00	Loudspeaker Controller	Connector Map	66517-70479
LSC22-001-521-0	1.00	Loudspeaker Controller	Environmental Qualification Form	66517+
LSC22-001-922-0	1.00	Loudspeaker Controller	Mechanical Installation	66517+

Section 2.0 ends following above documents

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.10	ECO1067: J101 PIN 12 CHANGED FROM N/C TO RESERVED	AUG 30/17	SK
1.20	RAS #997 - MODIFY EQUIPMENT LIST FOR OBSOLESCENCE	AUG 19/21	DMF

LSC22-001 INSTALLATION NOTES

NOTES:

1. ALL WIRES SHOULD BE 22 AWG UNLESS OTHERWISE SPECIFIED. ALL UNSHIELDED WIRE SHALL BE SELECTED IN ACCORDANCE WITH AC43.13-1B CHANGE 1, PARAGRAPHS 11-76 THROUGH 11-78. WIRE TYPES SHOULD BE TO MIL-W-22759 AS SPECIFIED IN AC43.13-1B CHANGE 1, PARAGRAPHS 11-85, 11-86 AND LISTED IN TABLE 11-11. ALL SHIELDED WIRE/CABLE SHOULD BE IN ACCORDANCE WITH MIL-C-27500.

2. CABLE LENGTH NOT TO EXCEED 30 FT [9.14 M], UNLESS OTHERWISE SPECIFIED.

△3 CABLE LENGTH NOT TO EXCEED 1 FT [0.3 M].

△4 SYSTEM CROSSTALK MAY BE EFFECTED BY STYLE OF HEADSET AND JACK. CHECK SPECIFICATIONS AND SYSTEM REQUIREMENTS BEFORE SELECTING AND INSTALLING.

△5 CABLE LENGTH NOT TO EXCEED 3.3 FT [1.0 M].

△6 SHIELDS SHOULD BE GROUNDED TO LOCAL AIRFRAME GROUND, UNLESS OTHERWISE SPECIFIED. SHIELD TERMINATION LENGTH NOT TO EXCEED 1 FT [0.3 M].

△7 REFERENCE SHEET 3 FOR AMPLIFIER WIRING CONFIGURATIONS.

△8 EQUIVALENT SERIES PARALLEL SPEAKERS MAY BE USED.

△9 +26.5VDC SUPPLIED AT 0.4 AMPS MAX.

△10 REFER TO LSC22 INSTALLATION & OPERATION MANUAL FOR OUTPUT LEVEL CONFIG SWITCH SETTING.

△11 APPLY GROUND TO REDUCE SPEAKER & EXT PA OUTPUTS BY 3DB.

△12 ONLY +28VDC LIGHTS OR +5VDC LIGHTS MAY BE USED AT ONE TIME.

DEFINITIONS:

N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.

N/C SPARE: NO CONNECTION INTERNALLY, BUT A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.

RESERVED: MAY BE CONNECTED AND USED IN THE FUTURE. THE CIRCUITRY MAY BE PRESENT OR ADDED TO ACTIVATE THE FUNCTION. THE PIN MAY BE USED FOR TEST PURPOSES. THERE IS NO EXTERNAL CONNECTION.

RESERVED SPARE: (RSV SP) RESERVED, BUT INSTRUCTIONS SHALL BE FOLLOWED TO ACTIVATE THE CIRCUITRY. A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	D.K.	Aug 19/21
APPROVED	T.B.	Aug 30/21

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL ±0.0625"
ANGULAR ±0.5°
TWO DECIMAL PLACE ±0.010"
THREE DECIMAL PLACE ±0.005"

MATERIAL: N/A

FINISH: N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

TITLE: LOUDSPEAKER CONTROLLER INTERCONNECT

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.20

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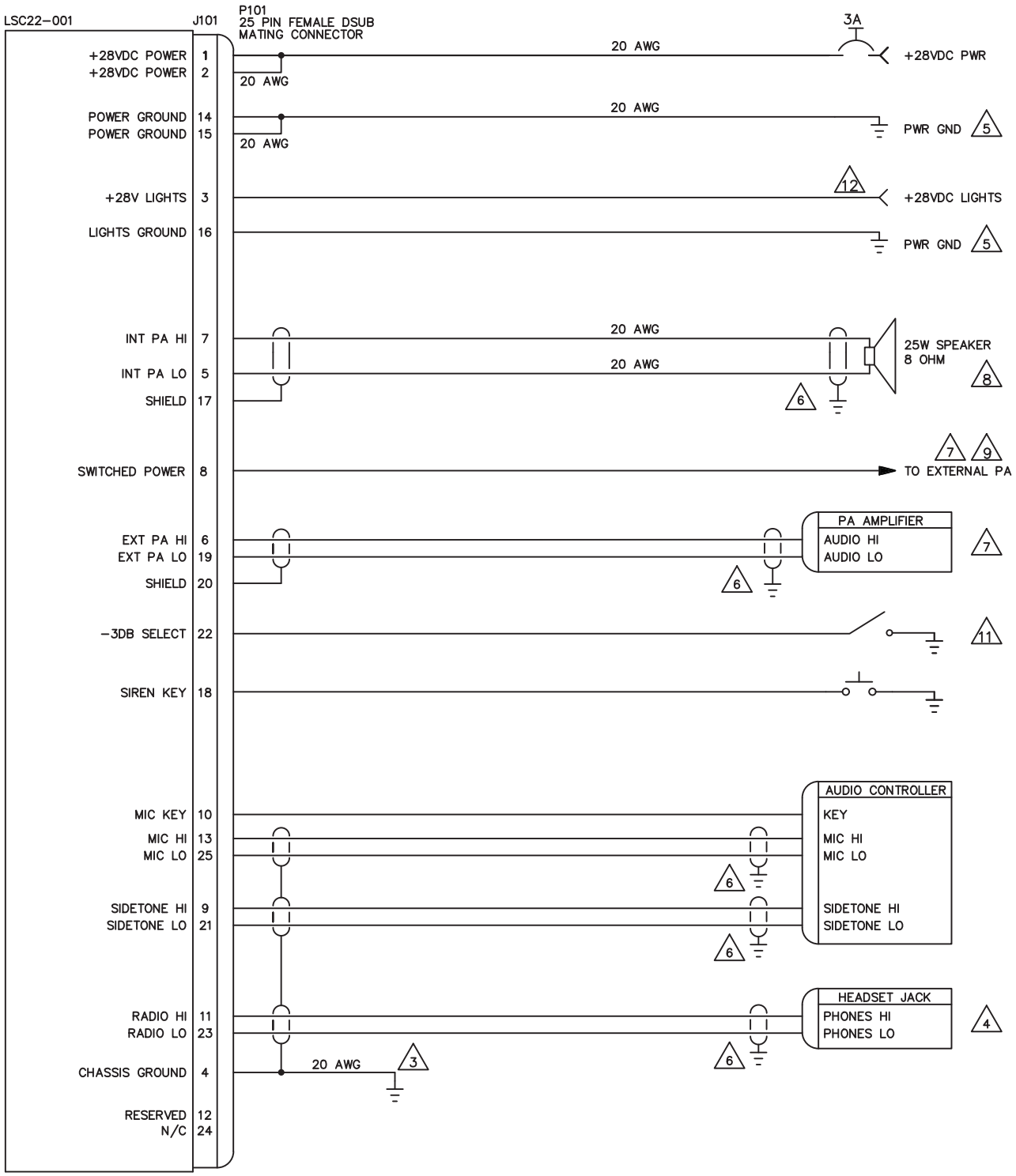

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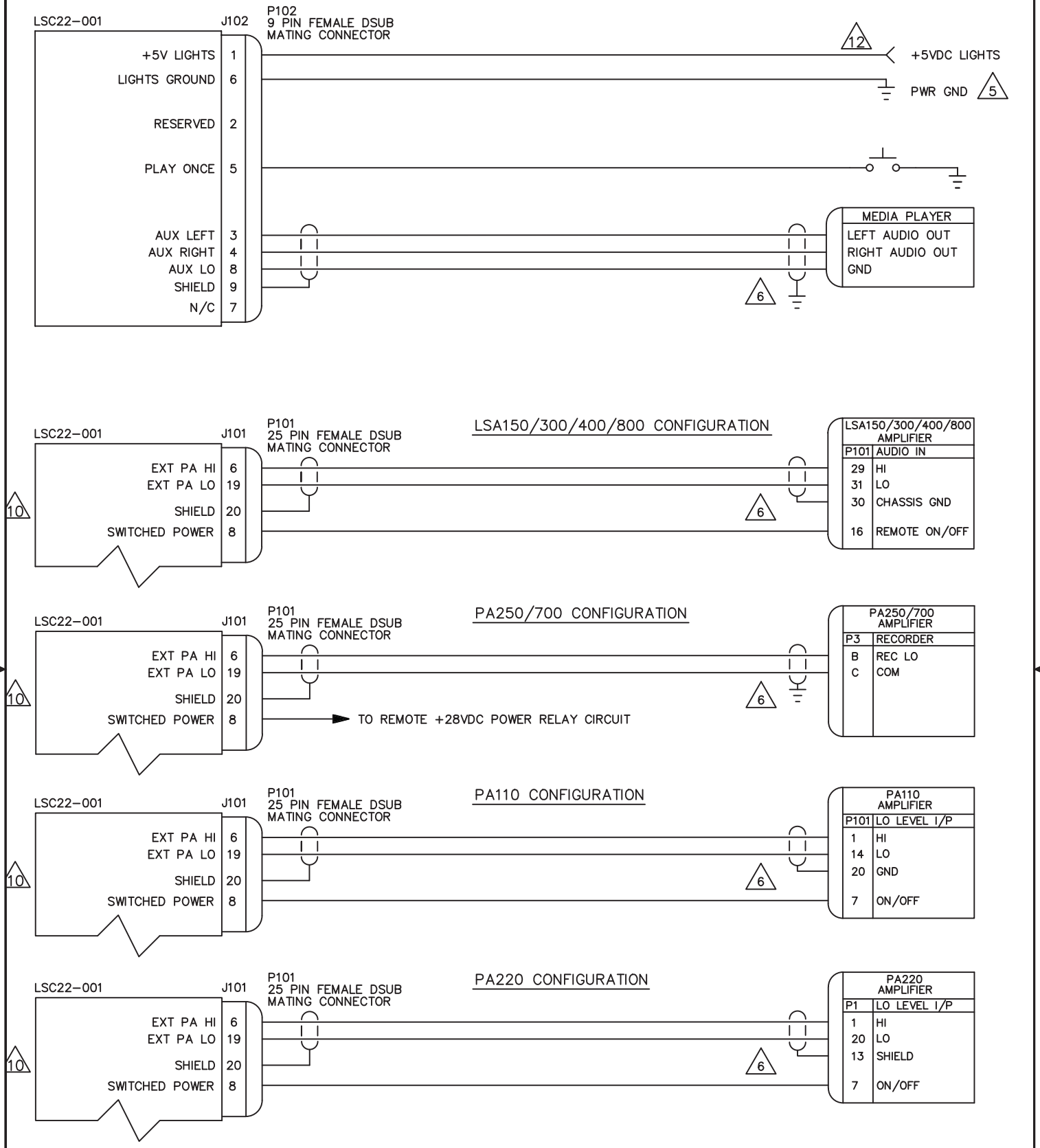

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1.10	ECO1067: J101 PIN 12 CHANGED FROM N/C TO RESERVED	AUG 30/17	SK

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APPROVED	TB	Aug 31/17

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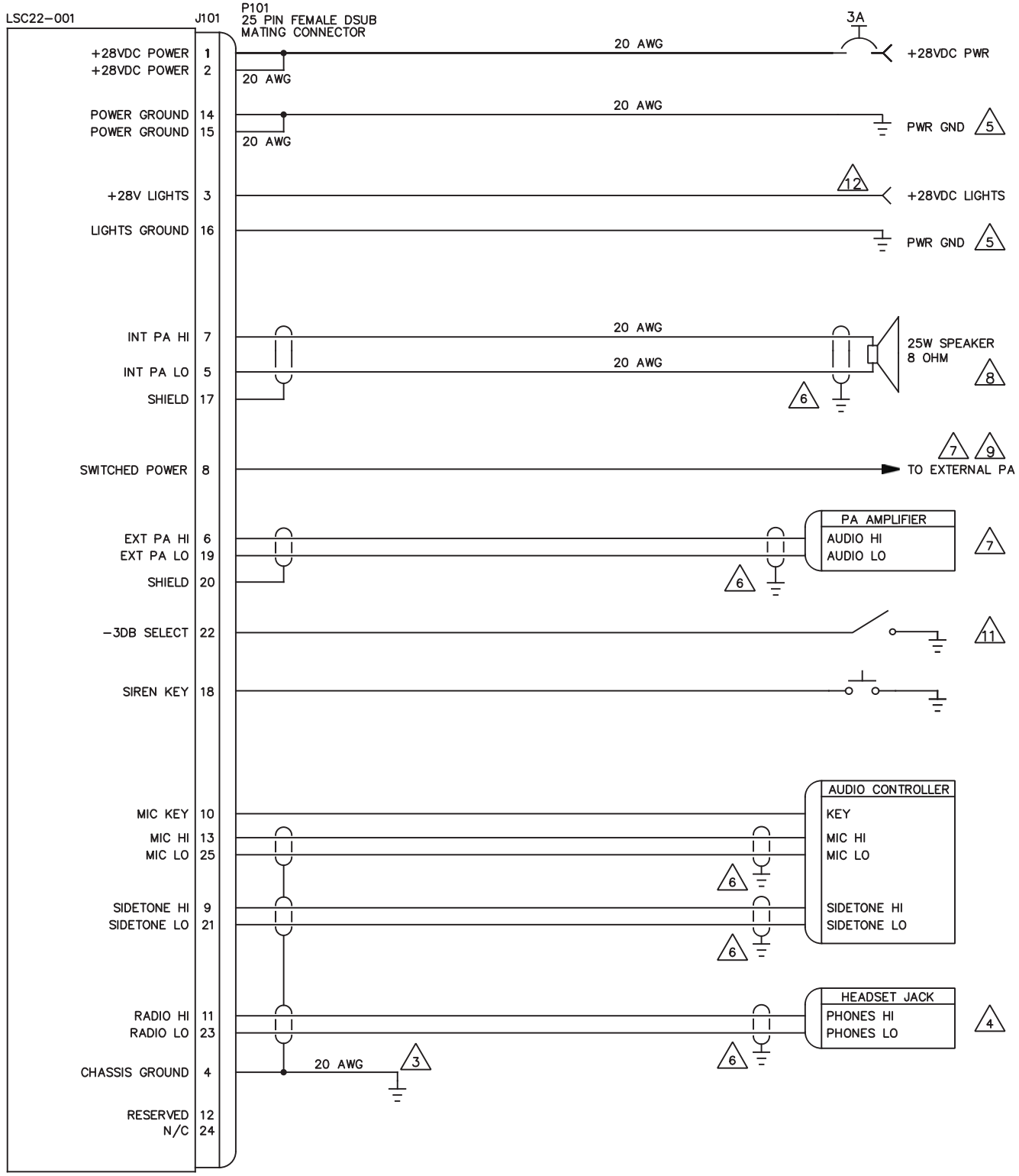

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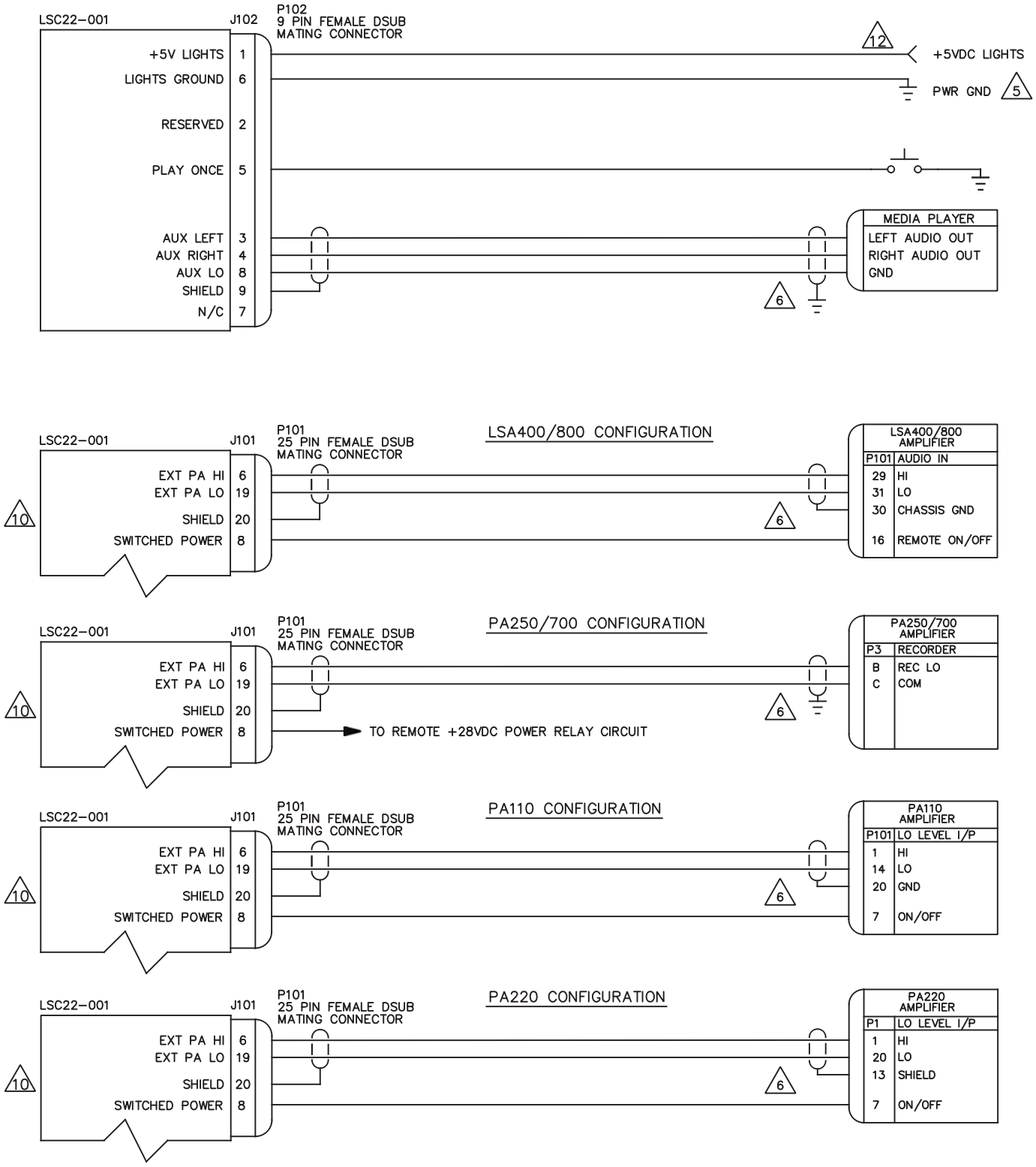

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1. ALL WIRES SHOULD BE 22 AWG UNLESS OTHERWISE SPECIFIED. ALL UNSHIELDED WIRE SHALL BE SELECTED IN ACCORDANCE WITH AC43.13-1B CHANGE 1, PARAGRAPHS 11-76 THROUGH 11-78. WIRE TYPES SHOULD BE TO MIL-W-22759 AS SPECIFIED IN AC43.13-1B CHANGE 1, PARAGRAPHS 11-85, 11-86 AND LISTED IN TABLE 11-11. ALL SHIELDED WIRE/CABLE SHOULD BE IN ACCORDANCE WITH MIL-C-27500.

2. CABLE LENGTH NOT TO EXCEED 30 FT [9.14 M], UNLESS OTHERWISE SPECIFIED.

△3 CABLE LENGTH NOT TO EXCEED 1 FT [0.3 M].

△4 SYSTEM CROSSTALK MAY BE EFFECTED BY STYLE OF HEADSET AND JACK. CHECK SPECIFICATIONS AND SYSTEM REQUIREMENTS BEFORE SELECTING AND INSTALLING.

△5 CABLE LENGTH NOT TO EXCEED 3.3 FT [1.0 M].

△6 SHIELDS SHOULD BE GROUNDED TO LOCAL AIRFRAME GROUND, UNLESS OTHERWISE SPECIFIED. SHIELD TERMINATION LENGTH NOT TO EXCEED 1 FT [0.3 M].

△7 REFERENCE SHEET 3 FOR AMPLIFIER WIRING CONFIGURATIONS.

△8 EQUIVALENT SERIES PARALLEL SPEAKERS MAY BE USED.

△9 +26.5VDC SUPPLIED AT 0.4 AMPS MAX.

△10 REFER TO LSC22 INSTALLATION & OPERATION MANUAL FOR OUTPUT LEVEL CONFIG SWITCH SETTING.

△11 APPLY GROUND TO REDUCE SPEAKER & EXT PA OUTPUTS BY 3DB.

△12 ONLY +28VDC LIGHTS OR +5VDC LIGHTS MAY BE USED AT ONE TIME.

DEFINITIONS:

N/C: NO CONNECTION. THE PIN IS NOT CONNECTED TO ANYTHING INTERNALLY, AND THEREFORE SHALL HAVE NO CONNECTION EXTERNALLY.

N/C SPARE: NO CONNECTION INTERNALLY, BUT A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.

RESERVED: MAY BE CONNECTED AND USED IN THE FUTURE. THE CIRCUITRY MAY BE PRESENT OR ADDED TO ACTIVATE THE FUNCTION. THE PIN MAY BE USED FOR TEST PURPOSES. THERE IS NO EXTERNAL CONNECTION.

RESERVED SPARE: (RSV SP) RESERVED, BUT INSTRUCTIONS SHALL BE FOLLOWED TO ACTIVATE THE CIRCUITRY. A SPARE WIRE SHALL BE INSTALLED IN THE WIRE HARNESS.

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	AEM	Jan 4, 2017
APPROVED	AEM TB	Jan 4/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL ±0.0625"
ANGULAR ±0.5°
TWO DECIMAL PLACE ±0.010"
THREE DECIMAL PLACE ±0.005"

MATERIAL: N/A

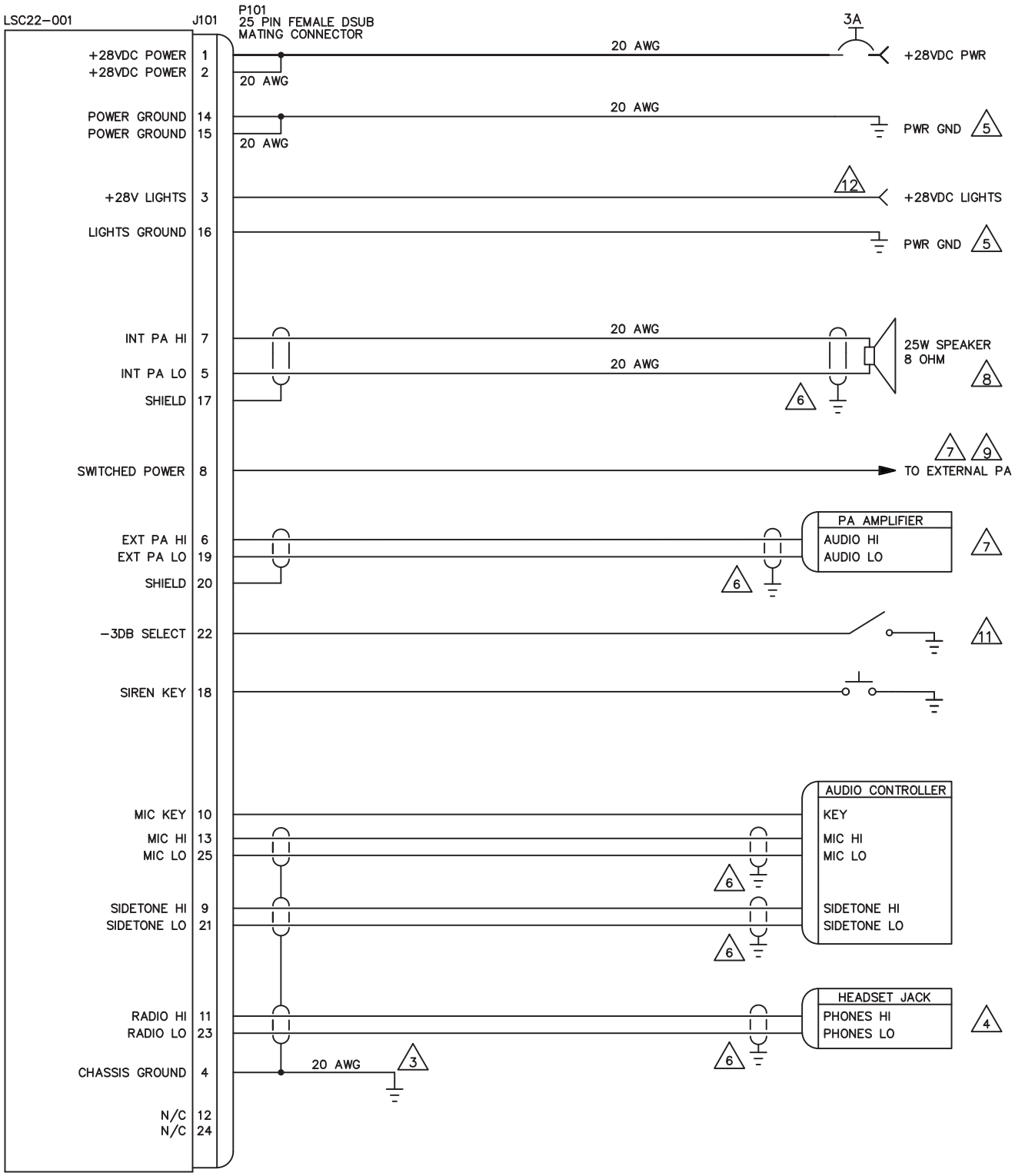
FINISH: N/A
N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

TITLE: LOUDSPEAKER CONTROLLER INTERCONNECT

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.00

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 403-0	SHEET:1 of 3



	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	AEM	Jan 4, 2017
APPROVED	AEM TB	Jan 4/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL_____ ±0.0625"
ANGULAR_____ ±0.5°
TWO DECIMAL PLACE___ ±0.010"
THREE DECIMAL PLACE___ ±0.005"

MATERIAL: N/A

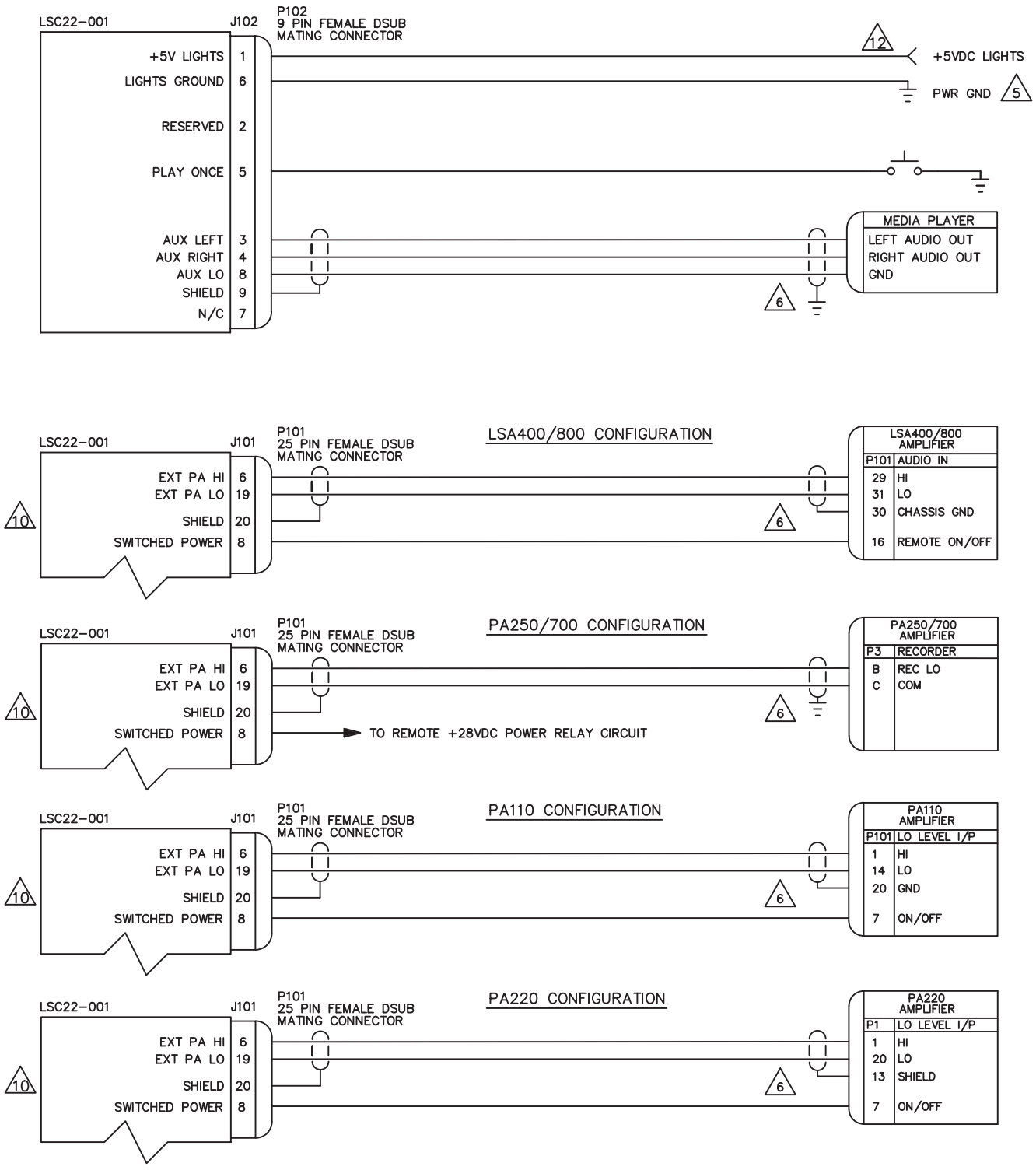
FINISH: N/A
N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

TITLE:
LOUDSPEAKER CONTROLLER INTERCONNECT

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.00

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 403-1	SHEET:2 of 3



	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED		Jan 4, 2017
APPROVED		Jan 4/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL ±0.0625"
ANGULAR ±0.5°
TWO DECIMAL PLACE ±0.010"
THREE DECIMAL PLACE ±0.005"

MATERIAL: N/A

FINISH: N/A
N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

TITLE:
LOUDSPEAKER CONTROLLER INTERCONNECT

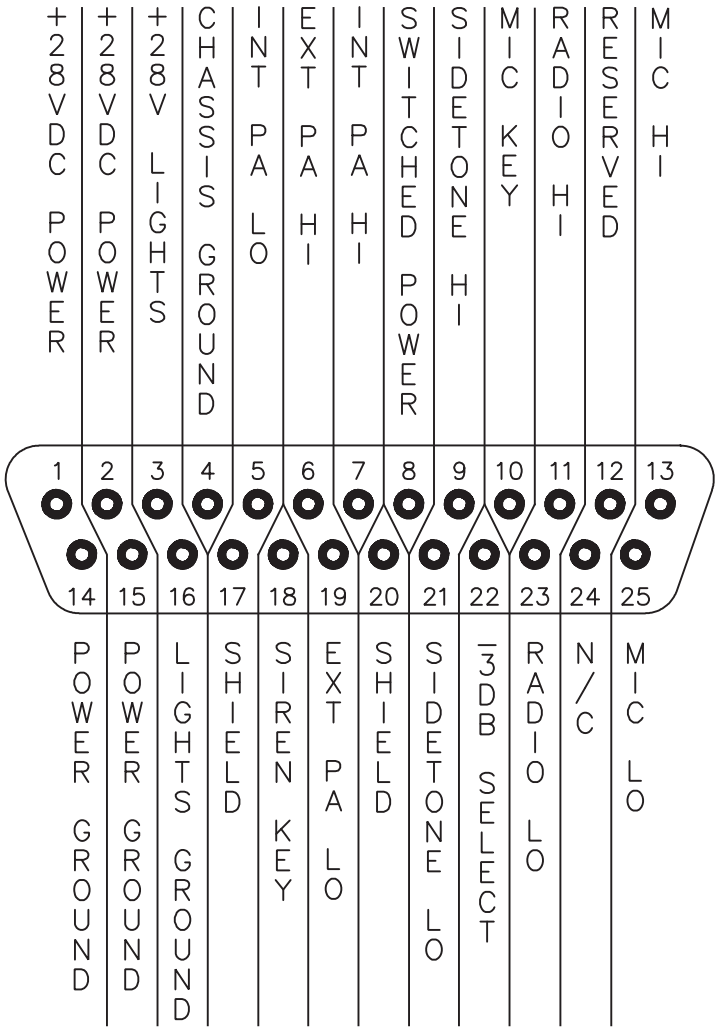
PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.00

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 403-2	SHEET:3 of 3

REVISIONS			
REV	DESCRIPTION	DATE	BY
1.10	ECO1067: J101 PIN 12 CHANGED FROM N/C TO RESERVED	AUG 30/17	SK

P101

25 PIN D–MIN SOCKET
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	RB	Aug 30, 2017
APPROVED	TB	Sept 6/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES:
FRACTIONAL_____ ±0.0625"
ANGULAR_____ ±0.5°
TWO DECIMAL PLACE____ ±0.010"
THREE DECIMAL PLACE___ ±0.005"

MATERIAL: N/A

FINISH: N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
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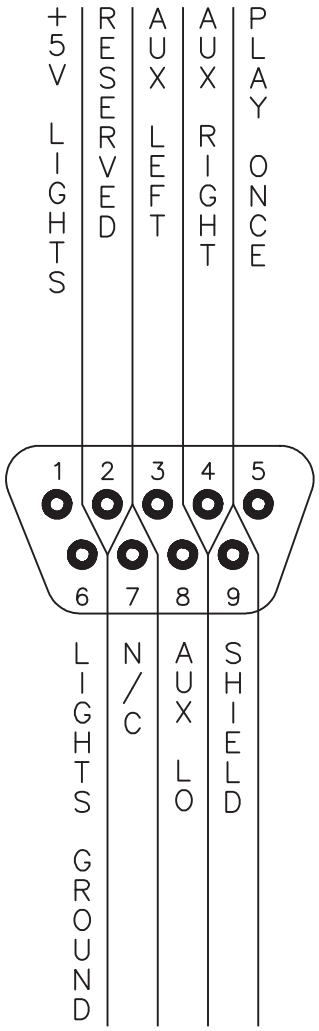
TITLE: LOUDSPEAKER CONTROLLER CONNECTOR MAP

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.10

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 405-0	SHEET:1 of 2

P102

9 PIN D–MIN SOCKET
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	RB	Aug 30, 2017
APPROVED	TB	Sept 6/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES:
FRACTIONAL_____ ±0.0625"
ANGULAR_____ ±0.5°
TWO DECIMAL PLACE____ ±0.010"
THREE DECIMAL PLACE___ ±0.005"

MATERIAL: N/A

FINISH: N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

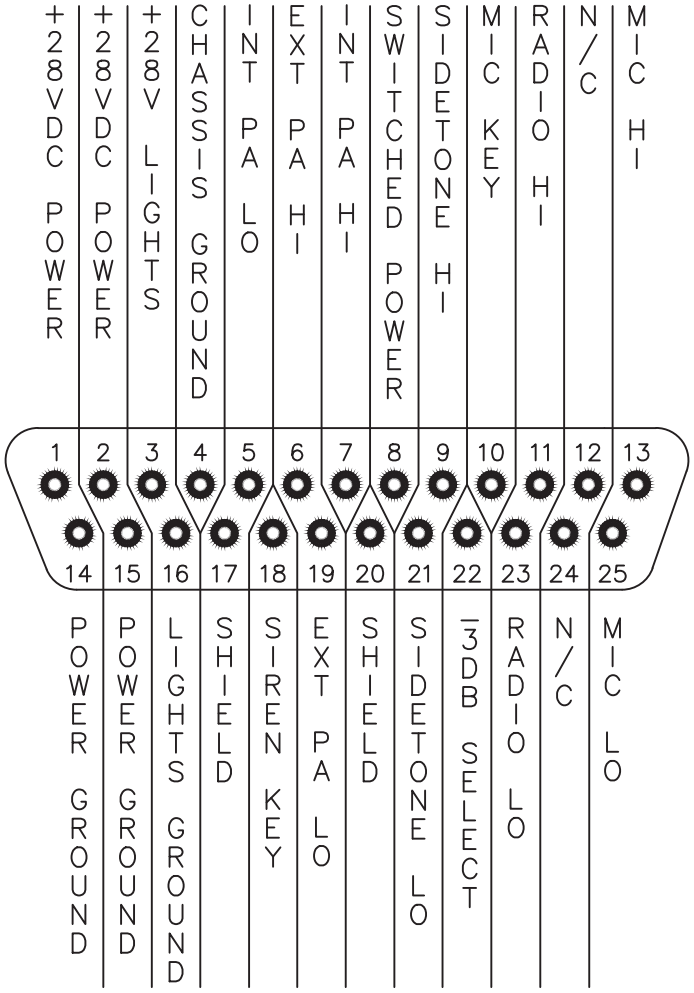
TITLE:
LOUDSPEAKER CONTROLLER CONNECTOR MAP

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.10

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 405-1	SHEET:2 of 2

P101

25 PIN D–MIN SOCKET
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED		Jan 4, 2017
APPROVED		Jan 4/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL_____ ±0.0625"
ANGULAR_____ ±0.5°
TWO DECIMAL PLACE___ ±0.010"
THREE DECIMAL PLACE___ ±0.005"

MATERIAL: N/A

FINISH: N/A
N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

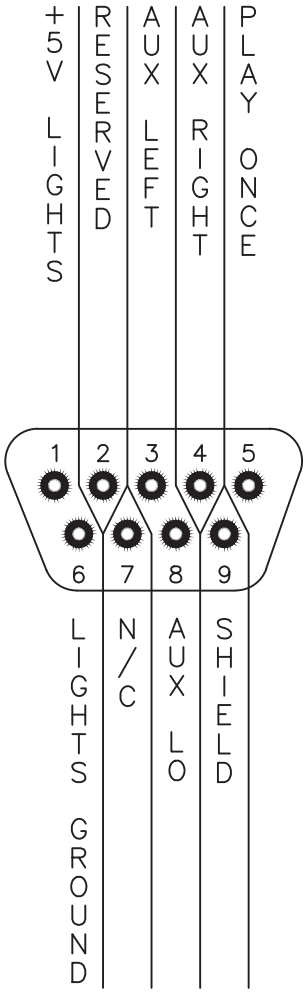
TITLE:
LOUDSPEAKER CONTROLLER CONNECTOR MAP

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.00

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 405-0	SHEET:1 of 2

P102

9 PIN D–MIN SOCKET
MATING CONNECTOR



VIEW IS FROM REAR OF AIRFRAME CONNECTOR

	NAME	DATE
DRAWN	SK	NOV 28/16
CHECKED	AEM	Jan 4, 2017
APPROVED	AEM TB	Jan 4/17

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
FRACTIONAL_____ ±0.0625"
ANGULAR_____ ±0.5°
TWO DECIMAL PLACE___ ±0.010"
THREE DECIMAL PLACE___ ±0.005"

MATERIAL: N/A

FINISH: N/A
N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
KELOWNA BC CANADA
(250)-763-1088
WWW.AEM-CORP.COM

TITLE: LOUDSPEAKER CONTROLLER CONNECTOR MAP

PAPER SIZE:	CAGE CODE	PART No.:	REVISION
A	L9015	LSC22-001	1.00

SCALE:	DO NOT SCALE DRAWING	DRAWING No.: 405-1	SHEET:2 of 2

ENVIRONMENTAL QUALIFICATION FORM

Description: **Loudspeaker Controller** Document: **LSC22-001-521-0100**

Part #: **LSC22-001** TSO #: **N/A**

Manufacturer's Specification and/or Other Applicable Specification:

Manufacturer: **Anodyne Electronics Manufacturing Corp.**

Address: **#15 - 1925 Kirschner Rd., Kelowna, BC, Canada. V1Y 4N7**

DO-160 Rev: **G**

Prepared By:	Checked By:	Approved By:
Steve Kempf Designer Jan 25/17	Nikolis Andrews Designer Jan 31 2017	Todd Blackstock R&D Manager Jan 31/17

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	**4.0**	**Equipment tested to Categories C4**
Ground Survival Low Temp	4.5.1	-55° C
Short-Time Operating Low Temp	4.5.1	-40° C
Operating Low Temp	4.5.2	-40° C
Ground Survival High Temp	4.5.3	+85° C
Short-Time Operating High Temp	4.5.3	+70° C
Operating High Temp	4.5.4	+70° C
In-flight Loss of Cooling	4.5.5	N/A
Altitude	4.6.1	+35,000 ft (+10,700 m)
Decompression	4.6.2	N/A
Overpressure	4.6.3	N/A
Temperature Variation	**5.0**	**Equipment tested to Category B** ± 5° C/min.
Humidity	**6.0**	**Equipment tested to Category A** 95% RH for 48 hrs.
Operational Shocks and Crash Safety	**7.0**	**Equipment tested to Category B**
Operational Shocks	7.2.2	6 g for 11 ms in all axes
Crash Safety Impulse	7.3.2	20 g for 11 ms in all axes
Crash Safety Sustained	7.3.3	20 g for 3 s in all axes

Conditions	Section	Description of Conducted Tests
Vibration	**8.0**	**Equipment tested to Category S** Profiles B and M. **Equipment tested to Category U2** Profiles F and F1.
Explosive Atmosphere	9.0	Category X, no test performed.
Waterproofness	10.0	Category X, no test performed.
Fluids Susceptibility	11.0	Category X, no test performed.
Sand and Dust	12.0	Category X, no test performed.
Fungus	13.0	Category X, no test performed.
Salt Fog	14.0	Category X, no test performed.
Magnetic Effect	**15.0**	**Equipment tested to Category Z** Defection of 1°: $0 \leq D \leq 0.3$ m
Power Input	**16.0**	**Equipment tested to Categories BXX**
Voltage (Average Value DC)	16.6.1.1	Maximum Operating Voltage: +30.3 Vdc Nominal Operating Voltage: +28.0 Vdc Minimum Operating Voltage: +22.0 Vdc Emergency Operating Voltage: +18.0 Vdc
Momentary Power Interruptions (DC)	16.6.1.3	50ms Max
Normal Surge Voltage (DC)	16.6.1.4	As per DO-160G
Engine Starting Undervoltage (DC)	16.6.1.5	As per DO-160G
Voltage Steady State (DC)	16.6.2.1	Maximum Operating Voltage: +32.2 Vdc Nominal Operating Voltage: +28.0 Vdc Minimum Operating Voltage: +20.5 Vdc
Low Voltage Conditions (DC)	16.6.2.2	As per DO-160G
Momentary Undervoltage Operation (DC)	16.6.2.3	+12 Vdc for 7 s
Abnormal Surge Voltage (DC)	16.6.2.4	+60 Vdc for 100ms, +40 Vdc for 1 s

Conditions	Section	Description of Conducted Tests
Voltage Spike	**17.0**	**Equipment tested to Category A** 600 Vpp for 10 µs Positive and negative spikes
Audio Frequency Conducted Susceptibility	**18.0**	**Equipment tested to Category B** 1.6 Vpp 0.2 to 1 kHz 4.0 Vpp 1 to 15 kHz
Induced Signal Susceptibility	**19.0**	**Equipment tested to Category ACE**
Magnetic Fields Into Equipment	19.3.1	20 Arms @ 400 Hz
Electric Fields Into Equipment	19.3.2	170 Vrms @ 400 Hz
Magnetic Fields Into Cables	19.3.3	18 A•m @ 380 to 420 Hz
Electric Fields Into Cables	19.3.4	360 V•m from 380 to 420 Hz
Spikes Induced Into Cables	19.3.5	Positive and negative spikes as per DO-160G
Radio Frequency Susceptibility	20.0	Category X, no test performed.
Radio Frequency Emission	21.0	**Equipment tested to Category M**
Conducted RF Emission	**21.4**	**Power lines: 150 kHz to 152 MHz** **Interconnecting Cables: 150 kHz to 152 MHz**
Radiated RF Emission	21.5	Category X, no test performed.
Lightning Induced Transient Susceptibility	22.0	Category X, no test performed.
Lightning Direct Effects	23.0	Category X, no test performed.
Icing	24.0	Category X, no test performed.
Electrostatic Discharge	**25.0**	**Equipment tested to Category A** 15,000 Vp, 10 positive and negative spikes.
Fire, Flammability	26.0	Compliant to FAR 23.853 by analysis. (LSC22-001-652-0)

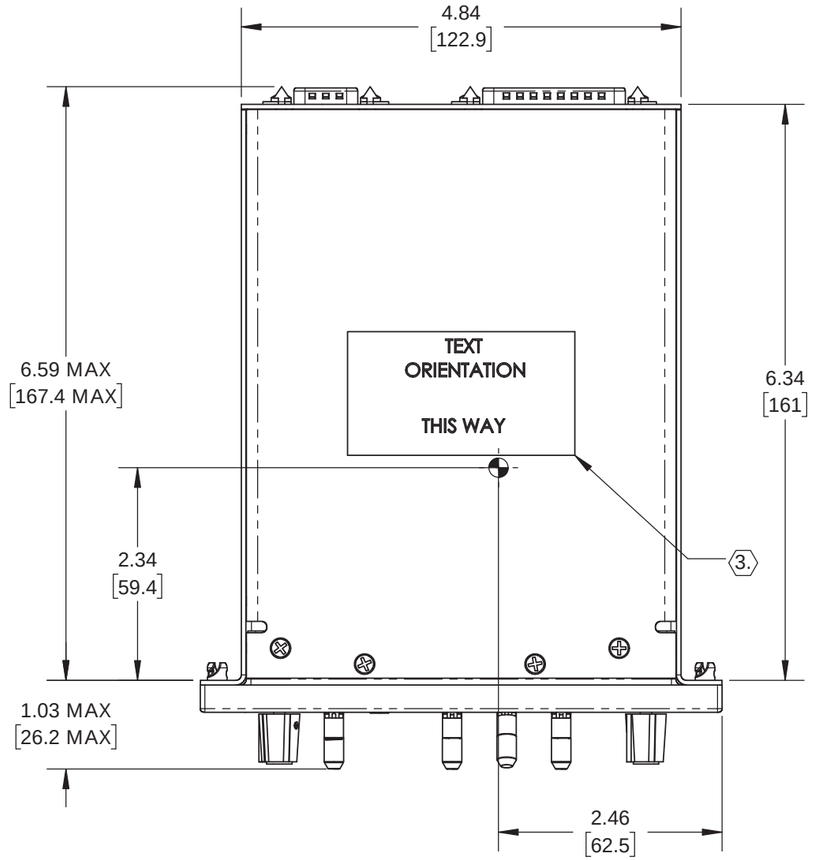
REMARKS

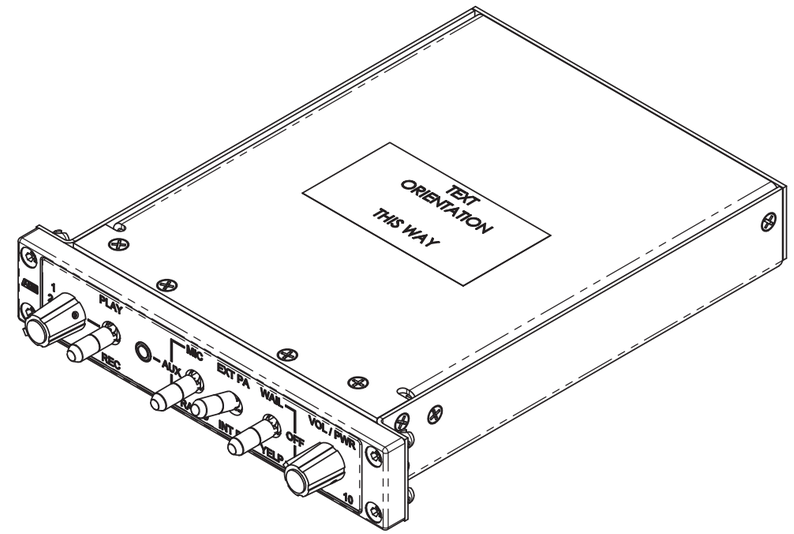
- Sections 4 to 8, 15 to 19, 21.4 and 25 tests were conducted at Anodyne Electronics Manufacturing Corp. (AEM) in Kelowna BC.
- Section 16.6.1 part (b) Requirement for Equipment with Digital Circuits and (d) Double Interrupt Requirement for dc Equipment with Digital or Memory Devices were tested.
- Section 21.5 (radiated RF emissions) was not tested.
- Section 26 is qualified by analysis to FAR 23.853. Acrylic faceplate material was tested at Exova in Mississauga Ontario.

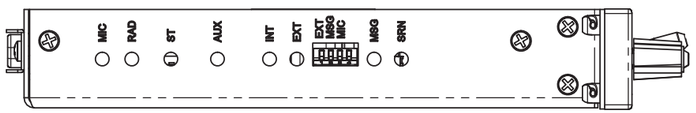
End of Environmental Qualification Form

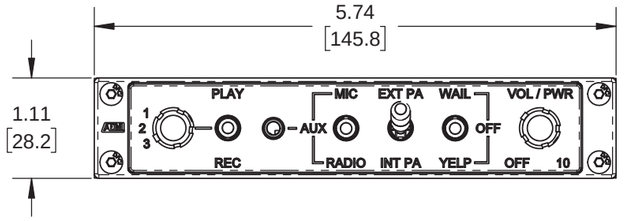
NOTES:

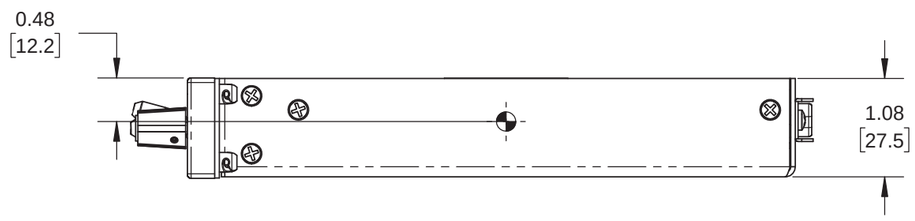
1. MASS: 1.3 lbs [0.6 kg] MAX.
2. ⊕ APPROXIMATE CENTER OF GRAVITY.
3. PRODUCT LABEL.











	NAME	DATE
DRAWN	DMF/LAC/AJV	08-Nov-16
CHECKED	AJV	Nov 9/16
APPROVED	TB	Dec 3/16

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MM]
TOLERANCES:
ANGULAR ±0.5°
FRACTIONAL ±0.0625"
ONE DECIMAL PLACE ±0.100"
TWO DECIMAL PLACE ±0.030"
THREE DECIMAL PLACE ±0.010"

MATERIAL: N/A

FINISH: N/A

ANODYNE ELECTRONICS MANUFACTURING CORP.
15-1925 KIRSCHNER RD.
KELOWNA BC V1Y 4N7
(250)-763-1088
WWW.AEM-CORP.COM

TITLE:
LOUDSPEAKER CONTROLLER MECHANICAL INSTALLATION

PAPER SIZE:	CAGE CODE	PART No. :	REVISION
B	L9015	LSC22-001	1.00

SCALE: 3:5 | DO NOT SCALE DRAWING | DRAWING No. : 922-0 | SHEET: 1 OF 1

Section 3.0 Operation

3.1 Introduction

Information in this section consists of functional and operational procedures for the LSC22 Loud Speaker Controller.

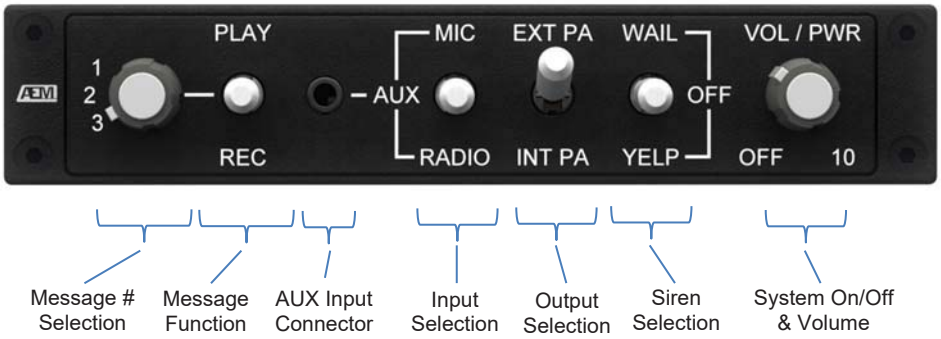
3.2 General

The LSC22 controls audio from various sources to be routed to either internal cabin speakers or an external speaker amplifier.

The LSC22 also has the ability to record and store 3 separate messages for playback either as one-time or repeating. The AUX connector provides the user with an external point to inject audio directly or for recording and playback.

Two sirens are available for initial use without requiring any setup or programming. The WAIL is a slow sweeping continuous tone and the YELP is a much faster sweeping continuous tone. These tones have the option of being replaced during off line programming.

3.3 Controls and Indicators



3.3.1 Message Selection/Function

Selection for playing or recording of Messages 1, 2, or 3.

3.3.1.1 Messages 1 & 2

Messages 1 and 2 are stored in the LSC22 non-volatile memory and are each up to 30 seconds in length. These messages are recorded with the unit powered on.

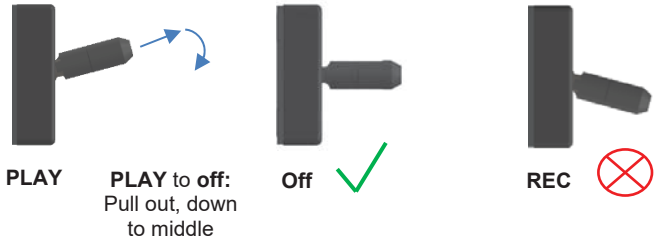
The source input is from either the MIC or AUX audio inputs and are supplied from factory as empty (blank).

Recording for Messages 1 and 2 is accomplished by setting the rotary selector to the desired message number and setting the PLAY/REC switch to REC while the desired audio is present. Recording ends when the PLAY/REC switch is set to the center (off) position.

To play either Message 1 or 2 a single time, set the rotary selector to the desired message number, set the PLAY/REC switch to the center (off) position, then momentarily activate the PLAY ONCE discrete input.

To play either Message 1 or 2 continuously, set the rotary selector to the desired message number and set the PLAY/REC switch to PLAY. To end continuous playback, or after the message has played the desired number of times, set the PLAY/REC switch to the center (off) position.

CAUTION:
When setting the PLAY/REC switch from PLAY to the center position (off), ensure to not go past the switch center position to the REC position.
This will result in the selected message 1 or 2 being erased.



3.3.1.2 Message 3

Message 3 is stored in other dedicated non-volatile memory in the LSC22 and is up to a 120 seconds in length. This message can only be recorded with the unit powered off. The source input is from the AUX connector (USB input) using the supplied USB Type A to 3.5mm 4 conductor cable and the LSC-APS software loaded with a digital wav file. Message 3 is supplied from factory with an LSC22 product description.

To play Message 3, set the rotary selector to position 3 and the WAIL/YELP switch set to OFF, then set PLAY/REC switch to PLAY. Message 3 will only play continuously. To end continuous playback, set the PLAY/REC switch to the center (off) position.

Message 3 is not capable of being played a single time with the PLAY ONCE discrete input.

The RADIO input is not available for recording.

The LSC-APS software is available for free download from the AEM website www.aem-corp.com.

3.3.2 AUX Input

The LSC22 front panel AUX connector serves a dual purpose. One with the unit powered on as a stereo audio input source. The other with the unit powered off as a USB configuration port.

The AUX audio input connection can either be from the front panel jack or from the rear dmin connector. The rear connector input is disabled when the front panel jack has a 3.5mm plug inserted.

3.3.3 Input Selection

Individually selects the audio input between MIC, AUX, or RADIO that is to be routed to the output (EXT PA/INT PA) or the recording input (Message 1 or 2).

When set to MIC the microphone audio is also routed through to the Sidetone output.

The microphone key input is selectable to be either keyed or live (MIC switch on the left side of the unit) and in the keyed mode is triggered from the MIC KEY discrete input.

The microphone and auxiliary audio inputs are compressed to limit excessive input levels and improve the dynamic range of each input.

3.3.4 Output Selection

Selects the desired audio output between EXT (External) PA or INT (Internal) PA.

The EXT PA audio output includes either of the following:

	Input Audio Selection					Summed With	Message/Siren Selection				
1	MIC	or	AUX	or	RADIO		Message 1	or	Message 2		
or											
2	MIC	or	AUX	or	RADIO		WAIL Siren	or	YELP Siren	or	Message 3

The INT PA audio output includes the following:

Input Audio Selection					Summed With	Message Selection*				
MIC	or	AUX	or	RADIO		Message 1	or	Message 2	or	Message 3

* - Requires MSG switch on side of unit to be in the up position.

3.3.5 Siren Selection

The LSC22 comes with default WAIL and YELP siren audio for use only with external speaker amplification (EXT PA). However, each siren can also be re-configured by loading an alternate digital wav file with the unit powered off using the same method as Message 3.

To activate the siren audio, set the PLAY/REC switch to the center (off) position, set the EXT PA/INT PA switch to EXT PA, set the WAIL/YELP switch to the desired siren, then trigger the SIREN KEY discrete input. The siren audio will be active as long as the SIREN KEY discrete input is active.

If so desired, the SIREN KEY discrete input can be directly connected to airframe ground. This will result in the siren being activated when the WAIL/YELP switch is set to either WAIL or YELP and will be active until the WAIL/YELP switch is set back to the center (off) position.

3.3.6 System On/Off & Volume

Controls turning the LSC22 on/off and the volume control of the EXT PA and INT PA audio.

When fully counter-clockwise into the detent (off) position, the LSC22 can have Message 3 and the siren audio programmed through the front panel AUX connector.

When switched out of the detent position, the LSC22 unit is turned on and provides a discrete SWITCHED POWER output for remote amplifier activation.

3.4 Sidetone

The LSC22 has a sidetone output derived solely from the microphone input and is activated by the MIC KEY discrete input.

3.5 -3dB Select

The LSC22 can provide a partial muting function by activating the -3DB SELECT discrete input.

This reduces the signal level on the EXT PA and INT PA audio outputs by 3dB.

This function is used to create an “auto level control’ that automatically increases the system output volume following engine start. It is typically controlled by a switching function in the aircraft (eg. oil pressure switch) that would allow the PA system to differentiate between the engine(s) running/not running.

End of Section 3.0